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THE RETENTION OF TANK CREWMAN SKILLS

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and James H. Harris
Human Resources Research Organization

ARI FIELD UNIT AT FORT KNOX, KENTUCKY

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changes in proficiency occurred as a function of time since training or relevance of job assignment. Results were discussed in terms of task characteristics and procedural factors.

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Armor Crew Training

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FOREWORD

Research in the Fort Knox Field Unit of the Army Research Institute for the Behavioral and Social Sciences (ARI) supports armor and tank crew training, including the development of simulators for training tank gunnery crewmen. Successful gunnery training builds on the basic Armor skills learned in Advanced Individual Training; this report covers a field study of the extent to which those basic skills are retained throughout the early months of assignment in a field unit. It is the final report for Task 2, Skill Retention, of the project "Continuation of Tank Systems Skills and Training Structure" accomplished by the Fort Knox Office of the Human Resources Research Organization (HumRRO) under Contract DAHC 19-75-C-0001. Research was responsive to requirements of Army Project 2Q162722A764, Training and Education, and was monitored technically by Donald F. Haggard of the ARI field unit.


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PREFACE

This is the Final Report for Task 2, Skill Retention, of a project entitled, "Continuation of Tank Systems Skills and Training Structure." The report covers a field study of the extent to which basic Armor job skills, acquired in Advanced Individual Training, are retained throughout the early months of assignment in a field unit.

The work reported here was performed at the Fort Knox Office of the Human Resources Research Organization (HumRRO), under Contract No. DAHC 19-76-C-0001 with the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI).

Donald F. Haggard was the Contracting Officer's Technical Representative. He provided administrative assistance, valuable criticism, and substantive suggestions for conceptualizing problems and solutions throughout the project.

HumRRO employees, other than the authors, who contributed to the project were Richard D. Healy, William J. Crum, and Donald R. Bisher.

BRIEF

PURPOSE

The purpose of this study was to examine the extent of skill retention among armor crewmen over the period between completion of basic armor training and the early months of field unit assignment, and to determine the effects on retention of elapsed time since training, job assignment, and type of skill.

PROCEDURE

Performance tests of basic armor crewman tasks were administered to ten classes of 19E (Gunner/Loader) and 19F (Driver) soldiers on completion of their MOS training and again four to eight months later. Percent of tasks passed for each MOS group on initial and follow-up tests was analyzed as a function of elapsed time since training (retention interval), relevance of unit job assignment, and category of task (common to all crewmen versus specific to a crew position).

RESULTS

Performance, as measured by percent of tasks passed, was only slightly above 50% overall and showed no change from the first to the second test period. When analyzed by task category however, the high level of initial performance on common tasks was found to decline on retesting, and the relatively low level of initial performance on job-specific tasks was found to increase. Length of retention interval or relevance of job assignment had no reliable effect on these trends. Results were discussed in terms of task and procedural variables, and the possible impact on retention measures of variation in task definition from school to the field was emphasized.

USE OF FINDINGS

Test results should be of interest to training managers in the U.S. Army Armor Center and to those responsible for armor training in units. Aspects of the design, procedure and results should be of interest to those studying the retention of job skills.

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THE RETENTION OF TANK CREWMAN SKILLS

INTRODUCTION

Newly learned skills will deteriorate if not used. Soldiering skills acquired in basic armor training, for example, may weaken or be lost altogether by the time they are called for in the soldier's first unit assignment. Forgetting occurs in varying degrees depending on the extent of no-practice period (retention interval), the type of skill, the extent of original learning, the extent of refresher training, and the amount and character of activities intervening between original learning and recall.

The literature on skill retention (Schendel, Shields, and Katz, 1978) suggests that variables affecting the long-term retention of skilled motor performance can be separated into task variables and procedural variables. Task variables concern the trainee or the training/test environment, procedural variables concern the manner in which training, final testing, or both occur. Task variables that affect the long-term retention of motor skill include the duration of the no-practice period (retention interval),¹ and the nature of the response required to accomplish a particular motor task. Procedural variables that may affect the long-term retention of motor skill include the degree of proficiency attained by the learner during initial training, the amount and kind of refresher training, and the amount and kind of interfering activities.

These variables represent those known or suspected to affect the retention of learned motor behavior chiefly on the basis of laboratory studies. Little systematic data, however, are available documenting the loss or retention of skills from training to job assignment in the field.

Three Army studies, designed to examine the training-to-job forgetting problem, illustrate the variability of retention data obtained outside the laboratory. One study (McCluskey and Schmidt, 1978) investigated skill decay curves for sixteen common Infantry tasks. A soldier was trained and tested on four of the sixteen tasks, then retested at one of three retest intervals (2-4 weeks, 6-7 weeks, or 10-13 weeks). Overall task pass rates were low (24% at the end of training and declined further through retesting. So few soldiers were available for retesting, however, no reliable trend in retention could be discerned. Retest scores increased for half of the tasks and decreased for the other half. Moreover, rated differences in the learning or performance difficulty of tasks were unrelated to retention scores.

¹If the no-practice period is inherent to the task, it is properly classified as a task variable; if manipulated experimentally, it takes on the characteristics of a procedural variable.

In the second study (Shields, Joyce, and VanWert, 1978) retention of six Chaparral tasks was tested to determine the most effective schedule of refresher training. Hands-on performance tests were developed and all soldiers were tested on completion of AIT, retested and retrained on arrival in the unit, and tested again four months later. An additional retesting-retraining session was interpolated for some after either one or two months in the unit. Testing (2nd training) was conducted hands-on, with soldiers using the appropriate technical manuals.

Retention, as measured in terms of percent of performance measures passed, held up between AIT and arrival in the unit but fell off slightly over the succeeding four months to a low of about 80% on four of the six tasks. Added refresher training, moreover, had no significant effect on the decline. The loss in proficiency was much more substantial when measured in terms of percent of soldiers passing a task (passing all performance measures), with the rate falling over the four months to a typical low of about 20%.

Baker and Winograd (1957) conducted a large cross-sectional study of combat skill retention. Over 4,000 trainees and TO&E infantrymen were tested at one of several points ranging from BCT through three or more years of unit assignment. A ten-point scoring system was used in evaluating performance on each of 17 combat skills. Overall, performance at the end of BCT averaged 62% (105.2 points out of a possible 170), 64% at the end of AIT, and 70% after one or more months in a unit. This trend was not consistent over all skills. Performance at the end of AIT improved on some skills and declined on others, the latter being for the most part those not retrained in AIT. Similarly, TO&E personnel performed less well than AIT trainees on four of the skills. Also revealed in the data was an indication that overall proficiency declined slightly over the first 24 months of unit assignment, then began to increase to a point where, beyond 36 months, performance was at its highest.

Despite differences in methodology, results of these studies suggest two tentative generalizations: (1) overall performance tends to decline during the early months of unit assignment, and (2) the direction and degree of change in performance, following initial training, is a function of the kind of task. Moreover, while interactions between types of tasks and time on the job have not been well examined, relevance to or frequency of task performance on the job represents a task dimension of importance to retention.

OBJECTIVE

The purpose of the present study was to extend this line of research in exploring the retention of job skills within the field of Armor. Specifically, the objective was to determine the extent of skill retention (or loss) among armor crewmen in the period

between completion of basic armor training and the early months of field unit assignment, and to explore the effects on retention of three factors: (1) type of skill (central versus peripheral to the job), (2) type of unit job assignment (trained for the position or not), and (3) time in the unit (retention interval.)

APPROACH

The approach taken in this study entailed the use of skill tests, measuring proficiency on critical basic armor tasks, administered to a sample of 19E (Gunner/Loader) and 19F (Driver) soldiers on completion of job training (OSUT¹) and again four to eight months later. This was accomplished in the following phases:

- . Preparation of Skill Tests.
- . Identification of Study Participants.
- . Scorer Training.
- . Test Administration.
- . Job Experience Data Collection.

PREPARATION OF SKILL TESTS

Tests of tank crewman performance were taken from the Tank Crewmen Readiness Test (TCRT), a combined written and hands-on test that in its original form covered 105 critical job tasks for the four crew positions on the M48A5 tank (Harris, Osborn, and Boldovici, 1977). The TCRT as adapted to the M60A1 tank (O'Brien, Crum, Healy, Harris, and Osborn, 1978), was modified in the following respects for this study:

- . Tank Commander tasks were omitted since OSUT addresses the gunner/loader and driver crew positions only.
- . The tasks were checked against the OSUT program of instruction to insure that none were included that were not covered in training. The task "Boresight tank searchlight using primary method," for example, was deleted because it was not covered in OSUT.
- . All written portions of the task tests were omitted except the target acquisition tests.

¹OSUT, or One Station Unit Training, represents a consolidation of what previously were Basic Combat and Advanced Individual Training phases.

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- . Tactical driving and tactical gunnery were omitted since they were being tested in a concurrent study (Maitland, Eaton, and Neff, 1979).
 - . Selected common tasks (e.g., first aid), covered in OSUT but not on the TCRT, were added to the test in order to provide some representation of tasks less routinely exercised on the job.
 - . The tasks were grouped for administration at five test stations in a manner reflecting the functional relevance among tasks, while making efficient use of support equipment.

Tasks covered in the tests are listed by station and relevant crew position in Table 1. Driver trainees were tested at Station 1-A and 4 on a total of 22 tasks, 10 driver tasks and 12 common tasks. Gunner/loader trainees were tested at Stations 1-B, 2, 3 and 4 on a total of 29 loader tasks, 17 gunner tasks and 12 common tasks. The tests are presented in Appendix A.

IDENTIFICATION OF STUDY PARTICIPANTS

Participants in the skill retention study were drawn from ten OSUT companies (in three battalions) at Fort Knox. The selections were based on where the trainees were to be assigned upon completion of OSUT. Since Fort Hood (Texas) and USAREUR are the modal unit assignments, only graduates destined for these two field locations were included in the study. This approach to identifying participants reduced the cost of tracking graduates to their unit assignments for follow-up testing. The participants were drawn from ten training companies of about 100 men each. Approximately 36 percent of OSUT graduates were scheduled for assignment to Fort Hood or USAREUR. All were identified for initial testing, but several were lost because of sick call, emergency leave, reassignment, or other administrative reasons. Only 295 actually participated in initial testing. Of those 295, 112 (38%) completed driver training and took the 19F track of the readiness tests, and 184 (62%) graduated as gunner/loader and took the 19E track. Table 2 shows the number of soldiers by OSUT company and duty position who underwent initial testing.

Table 1

Tasks Tested by Station and Crew Position

TEST STATION	TYPE OF TASK		
	DRIVER	LOADER	GUNNER
Sta. 1-A	1. Check M27 Periscope 2. Remove M27 Periscope 3. Check M24 Periscope 4. Install M24 Periscope 5. Operate M24 Periscope 6. Check Gas Part. Unit 7. Prep.to-Fire (Driver) 8. Check Track Tension		
Sta. 1-B		1. Check Eng-Trans. Oil 2. Check Track Tension 3. Adjust Track Tension 4. Check Gas Part. Unit 5. Stow Mn. Gn. Rounds 6. Load Main Gun (A) 7. Load Main Gun (B) 8. Load Main Gun (C) 9. Ready Coax 10. Clear Mn. Gn. Misfire 11. Unload Mn.Gn. Misfire 12. Reduce Coax Stoppage	1. Check Gas Part. Unit 2. Charge Man. El.System 3. Prepare Telescope 4. Prepare Periscope
Sta. 2		13. Clear Coax 14. Remove Coax 15. Disassemble Coax 16. Assemble Coax 17. Check Coax Operation 18. Mount Coax 19. Load Coax 20. Remove Breech Block 21. Disassemble Brch.Blk. 22. Assemble Breech Block 23. Install Breech Block	
Sta. 3		24. Prep. for Boresight 25. Boresight Coax 26. Check Mn.Gn. Align. 27. Prep.-to-Fire (Loader)	5. Place Turret in Opn. 6. Prepare-to-Fire (A) 7. Prepare-to-Fire (B) 8. Prepare-to-Fire (C) 9. Prep. for Boresight 10. Prep. Azim. Indic. 11. Operate El. Quadrant 12. Boresight Telescope 13. Boresight Periscope 14. Boresight IR Sight 15. Boresight Searchlight 16. Boresight Coax
Sta. 4	. Read Replenisher Tape		
	. Know Target Acquisition Procedures		
	1. Load .45 Pistol 2. Clear .45 Pistol 3. Disassem. .45 Pistol 4. Assemble .45 Pistol	5. Clear .45 Stoppage 6. Load Submachinegun 7. Clear Submachinegun 8. Disassem. Submchgn.	9. Assemble Submachinegun 10. Clear Submchgn Stoppage 11. Give First Aid to Burn 12. Give First Aid to Fracture

Table 2
Number of Soldiers Participating in
Initial Testing

AIT Company	Duty Position	
	19F (Driver)	19E (Gunner/Loader)
A-2-1	6	12
B-2-1	23	25
C-2-1	15	31
D-2-1	3	8
B-3-1	14	20
C-3-1	10	32
A-4-1	10	20
B-4-1	6	15
C-4-1	11	21
D-4-1	<u>14</u>	<u>-</u>
TOTAL	112 (38%)	184 (62%)

SCORER TRAINING

The original plan was to use the same scorers for the duration of the study to conduct both the initial testing and the follow-up. The original scorers, who were NCOs provided by the Armor School, were not available for the follow-up testing; therefore, new scorers were trained and used at each follow-up location (Fort Hood and USAREUR). Several scorer teams, consisting of a mix of NCOs and junior officers, were trained in USAREUR. Since the original team provided by the Combined Arms Training Directorate (CATD) was not going to be available on the day testing began, another team was organized and trained for the first USAREUR battalion to be tested. Each time soldiers from a new battalion were tested, at least one of the CATD scorers was replaced. Training orientations were held for each new scorer. The training procedure was the same each time. First, scorers were briefed on the purpose of the study and the kinds of tests to be administered, and instructed in the general scoring procedures to be followed (Appendix B). Then all completed their scorer preparation by alternately performing and scoring the hands-on tests.

TEST ADMINISTRATION

The skill tests were administered twice--once when the soldiers completed OSUT, and again after assignment to an Armor unit at Fort Hood or USAREUR. Testing done at the end of training required that the soldiers to be tested be held over for five days after graduation. By testing the participants from one training company in that five-day period, all participants were tested the first time in a ten-week period. (Testing was not completed in ten consecutive weeks, however, because of breaks in the OSUT training cycle.)

The second administration began three months after completion of the initial testing. This produced a range of retention intervals: that is, elapsed time of from four to eight months between first and second testing for a soldier. The second, or follow-up administration was conducted over a two month period. Soldiers to be retested were drawn from units in two divisions at Fort Hood and one division in USAREUR. That only one of five divisions with Armor units was made available in USAREUR severely limited the number of pretested soldiers accessible for follow-up. Moreover, USAREUR testing was conducted during annual gunnery training at Grafenwhor where the priority of training activities occasionally preempted scheduled test sessions.

Test procedures were essentially the same at each location. When soldiers arrived at the test site, they were separated into two groups: drivers and gunner/loaders. The drivers were assigned to

Station 1-A and the gunner/loaders, in equal numbers, to Stations 1-B, 2 and 3. Whenever necessary, some soldiers began at Station 4. This occurred if the number of soldiers available for testing at any one time was so great that congestion at one of the test stations would result if Station 4 were not open. Testing at Stations 1-A, 1-B, 2 and 3 was done on M60A1 tanks; Station 4 testing was done in a building or other sheltered area.

Drivers proceeded from Station 1-A to Station 4, or in rare instances, from Station 4 to Station 1-A. Gunner/loaders normally began at Station 1-B and progressed through Stations 2, 3 and 4, though some began at Station 4 and then moved through 1-B, 2 and 3. When a soldier completed all the tests, he returned to his unit. Table 3 shows the number of soldiers by OSUT company and duty position who underwent initial and follow-up testing. Fewer soldiers than expected took part in the follow-up. Some Armor units, as mentioned, were not available during the retest period, but individual absences, for the usual personal and administrative reasons, also took their toll.

JOB EXPERIENCE DATA COLLECTION

During the follow-up phase, each participant filled out a brief questionnaire (Appendix C) about his job and unit training experience. Questions pertained to such things as current job position, time in that position, and training received on-the-job. These factors were intended for use as control variables in the analysis of skill retention, but double-checking some of the responses with supervisors indicated that the self-reported data were not reliable enough to be used.

Table 3
Number of Soldiers Participating In
Initial and Follow-up Testing

AIT Company	Duty Position					
	19F (Driver)			19E (Gunner/Loader)		
	Initial Knox	Follow-Up Hood	Follow-Up USAREUR	Initial Knox	Follow-Up Hood	Follow-Up USARUER
A-2-1	6	2	1	12	4	1
B-2-1	23	3	-	25	4	5
C-2-1	15	1	6	31	4	6
D-2-1	3	1	-	8	1	-
B-3-1	14	5	1	20	2	2
C-3-1	10	4	-	32	11	3
A-4-1	10	1	-	20	0	6
B-4-1	6	3	-	15	6	1
C-4-1	11	1	1	21	4	4
D-4-1	<u>14</u>	<u>2</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
SUBTOTAL		23	9		36	28
TOTAL	112		32	184	64	

RESULTS

Data for a few of the soldiers who were tested both times were dropped from the analysis since they failed to complete major portions of either the initial or follow-up tests. Usable data were available for 29 of the 32 trained-drivers and for 60 of the 64 trained-gunner/loaders. A breakdown of each group by retention interval and job assignment is given in Tables 4 and 5.

A soldier's test performance was measured in two ways: one measure being the relative number (percent) of tasks performed without error, the other being the average percent of steps per task correctly performed. From the standpoint of "GO vs. NO GO" task mastery, the second of these measures leads to scores that are deceptively high. This, together with the fact that the two were highly correlated ($r =$ approximately .88¹) led to a choice of the first (percent of tasks passed) as the criterion variable for the following analyses. Percent of steps or performance measures passed in each task is reported later.

OVERALL PERFORMANCE AND RETENTION

Overall results of the study, disregarding type of task and retention interval, are summarized in the bottom rows of Tables 6 and 7 and are shown graphically in Figure 1. Of the soldiers tested both times, the 29 trained as drivers passed 68% of the tasks on completion of AIT while the 60 trained as gunner/loaders passed only 50%. These initial performance levels remained essentially unchanged over the four to eight month follow-up period, with the drivers averaging 69% and the gunner/loaders 52% on retesting. Whether their unit assignment was to the crew position for which they were trained apparently had no overall effect on later task proficiency, since those malassigned (8 of the trained drivers and 33 of the trained gunner/loaders) performed on the follow-up test as well as those correctly assigned. It should be noted, however, that incorrect assignments could be viewed as a matter of degree, in that many were to other crew positions. Two of the eight malassigned drivers were loaders, and 27 of the 33 malassigned gunner/loaders ended up as drivers. Since there were so few drivers assigned to other jobs and so few gunner/loaders assigned to other than crew positions, distinctions in type of malassignment were not considered in data analysis.

¹Correlations between the two types of scores, percent of tasks passed and average percent of performance measures passed, are in Appendix D, Table D.1.

Table 4

Number of Trained Drivers Tested
By Job Assignment and Retention Interval

Retention Interval (Mo.)	Job Assignment		
	Driver	Other	All
< 5	9	1	10
5-6	5	1	6
> 6	7	6	13
All	21	8	29

Table 5

Number of Trained Gunner/Loaders Tested
By Job Assignment and Retention Interval

Retention Interval (Mo.)	G/L	Job Assignment		All
		Driver	Other	
< 5	9	7	2	18
5-6	4	8	1	13
6-7	5	7	2	14
> 7	9	5	1	15
All	27	27	6	60

Table 6

Initial and Follow-up Test Performance¹ of
Trained Drivers by Type of Task and Job Assignment

Type Task	Initial Test			Follow-Up Test		
	Job Assignment			Job Assignment		
	Driver (N=21)	Other (N=8)	All (N=29)	Driver	Other	All
Driver (10)	42.4 [19.2]	43.0 [23.4]	42.6 [20.0]	50.9 [21.1]	52.8 [19.6]	51.4 [20.4]
Common (12)	88.8 [10.0]	89.6 [10.7]	89.1 [10.0]	81.3 [13.4]	82.3 [18.1]	81.6 [14.5]
All (22)	68.2 [12.9]	69.2 [14.7]	68.5 [13.2]	68.2 [15.1]	70.1 [12.7]	68.8 [14.3]

¹Mean percent [and standard deviation] of tasks passed.

Table 7

Initial and Follow-up Test Performance¹ of
Trained Gunner/Loaders by Type of Task and Job Assignment

Type Task	Initial Test			Follow-Up Test		
	Job Assignment			Job Assignment		
	Gnr/Ldr (N=27)	Other (N=33)	All (N=60)	Gnr/Ldr	Other	All
Loader (29)	48.8 [19.4]	46.7 [19.1]	47.6 [19.1]	53.3 [14.2]	49.7 [17.2]	51.3 [15.9]
Gunner (17)	23.1 [16.5]	22.1 [12.4]	22.6 [14.3]	30.3 [17.3]	23.4 [11.5]	26.5 [14.7]
Common (12)	86.5 [9.0]	83.6 [12.4]	84.9 [11.0]	80.0 [16.6]	80.8 [14.9]	80.4 [15.6]
All (58)	51.7 [13.0]	49.5 [11.8]	50.5 [12.3]	53.6 [11.9]	50.6 [11.9]	51.9 [11.9]

¹Mean percent [and standard deviation] of tasks passed.

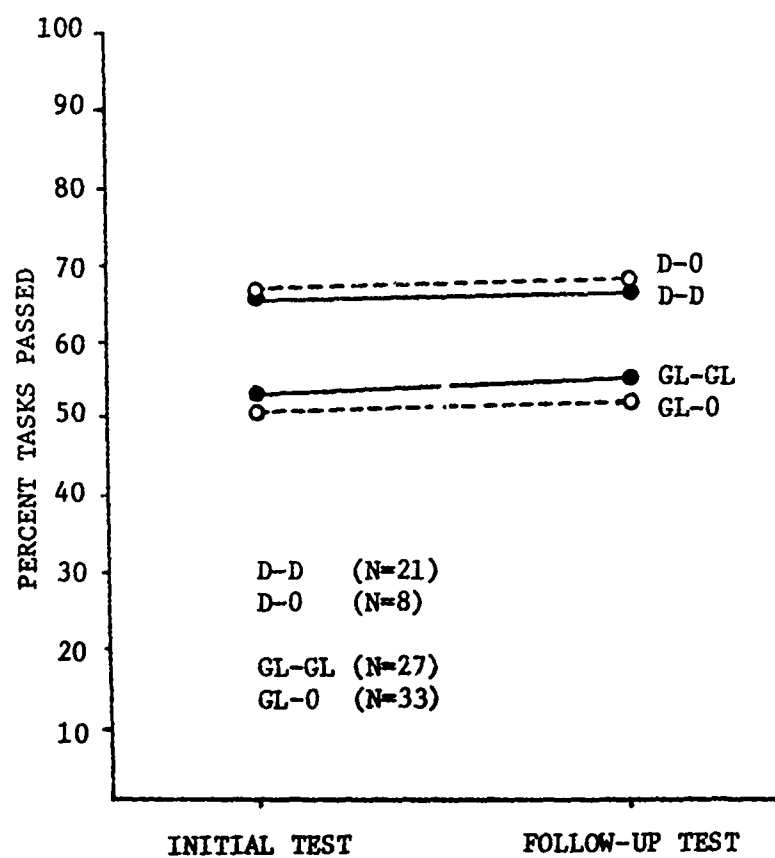


Figure 1. Mean percent of all tasks passed by trained drivers (D) and gunner/loaders (GL) as a function of test period and relevance (D or GL vs. O) of job assignment.

PERFORMANCE BY TYPE OF TASK

That performance overall showed no real gain or loss in task proficiency from initial to follow up testing fails to consider possible differences by type of task. Results by type of task and relevance of job assignment are given in Tables 6 and 7 and in Figures 2 and 3. Substantial and reliable differences in proficiency by type of task are evident for both the driver group (Figure 2) and the gunner/loader group (Figure 3). Initial performance of trained drivers averaged 89% for common tasks and 43% for driver tasks. On follow-up testing, these levels shifted to 82% and 51% respectively, showing in retesting a decline in proficiency on common tasks and an increase on driver tasks, which, though small, are statistically reliable.¹

Disregarding gunner tasks, results for the gunner/loaders (Figure 3) indicate similar trends. Performance on common tasks averaged 85% on the initial test and fell to 80% on follow-up, whereas performance on loader tasks began at 48% and rose slightly to 51% on retesting. Performance was lowest in the area of gunner tasks, where trained gunner/loaders averaged 23% initially, and 26% on follow-up. The decline on common tasks versus the increase on position-specific tasks represents a small but reliable difference.² It was for gunner tasks only, however, that any differential effect of job assignment appeared (bottom of Figure 3); those assigned as gunner/loaders scored seven percentage points higher on the retest than those assigned to other jobs (30% versus 23%). This effect, as any associated with the factor of job assignment, was not statistically significant.²

PERFORMANCE AND RETENTION INTERVAL

Presented in Tables 8 and 9 and in Figures 4 and 5, is performance by type of task for correctly assigned crewmen with different time (retention) intervals between initial and follow-up test. No systematic trends are evident in these data. That is, shifts in performance seem to follow no stable pattern as a function of time on the job--at least within the range of time intervals used in this study. Common tasks aside, drivers and gunner/loaders with less than five months on the job tended to show little or no change in performance on retesting. And those at the other extreme--more than six months on the job--tended to show an increase in retest performance. But among those in the 5-6 month interval, drivers scored higher on retesting and gunner/loaders remained about the same.

¹Significant ANOVA Task Type-by-Test Period interaction. (See Table D.1, Appendix D.)

²ANOVA Table D.3, Appendix D.

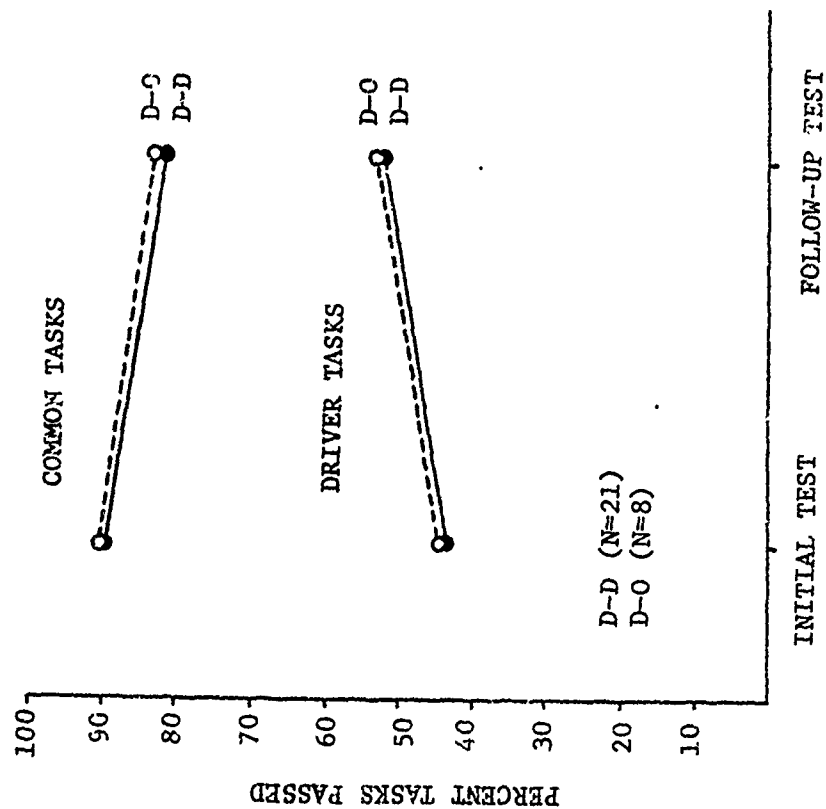


Figure 2. Mean percent of tasks passed by trained drivers as a function of test period and relevance of job assignment for two types of tasks.

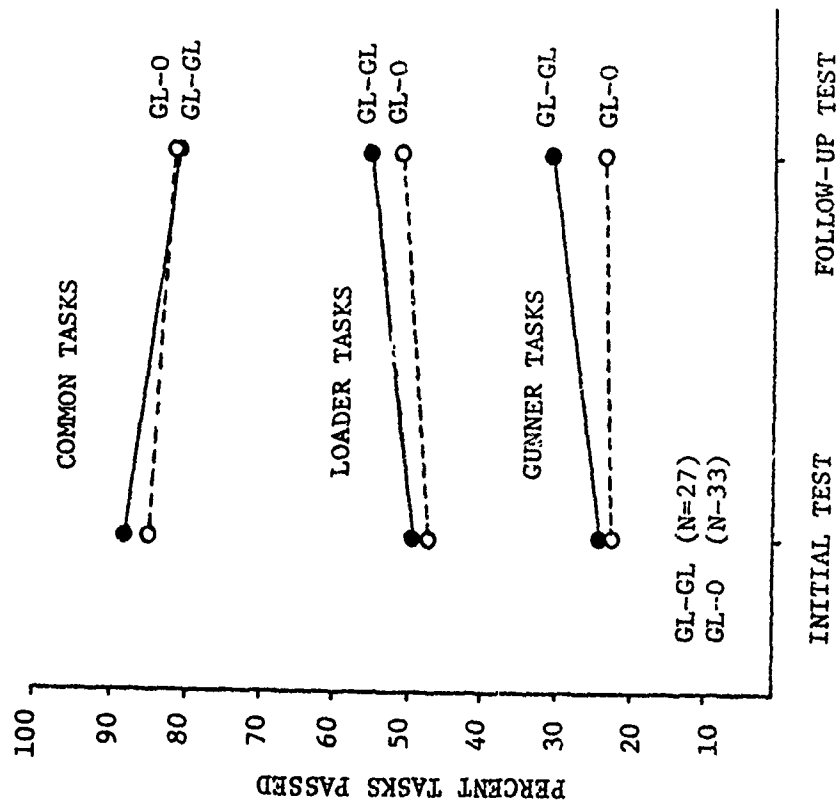


Figure 3. Mean percent of tasks passed by trained gunner/loaders as a function of test period and relevance of job assignment for three types of tasks.

Table 8

Initial and Follow-up Test Performance¹ of Correctly
Assigned Drivers by Test Interval and Type of Task

Type Task	Initial Test			Follow-Up Test		
	Test Interval (Mo.)			Test Interval (Mo.)		
	< 5 (N=9)	5-6 (N=5)	> 6 (N=7)	< 5	5-6	> 7
Driver (10)	37.8 [21.7]	46.6 [19.6]	45.3 [17.0]	42.2 [22.2]	62.1 [18.0]	54.1 [19.4]
Common (12)	89.8 [10.0]	85.0 [10.9]	90.4 [10.1]	75.0 [15.6]	90.0 [7.0]	83.1 [10.8]

¹Mean percent [and standard deviation] of tasks passed.

Table 9

Initial and Follow-up Test Performance¹ of Correctly
Assigned Gunner/Loaders by Test Interval and Type of Task

Type Task	Initial Test				Follow-Up Test			
	Test Interval (Mo.)				Test Interval (Mo.)			
	< 5 (N=9)	5-6 (N=4)	6-7 (N=5)	> 7 (N=9)	< 5	5-6	6-7	> 7
Loader (29)	49.7 [16.9]	56.6 [21.1]	31.9 [24.1]	53.6 [15.6]	42.6 [12.0]	55.7 [14.9]	56.8 [16.8]	60.9 [22.2]
Gunner (17)	28.1 [20.8]	23.8 [13.6]	19.4 [15.3]	19.8 [14.6]	23.3 [18.7]	24.4 [17.3]	33.9 [18.1]	38.1 [13.8]
Common (12)	85.4 [10.2]	87.5 [16.0]	90.0 [9.1]	85.2 [3.4]	78.0 [24.0]	87.5 [8.3]	76.7 [12.4]	80.6 [13.2]

¹Mean percent [and standard deviation] of tasks passed.

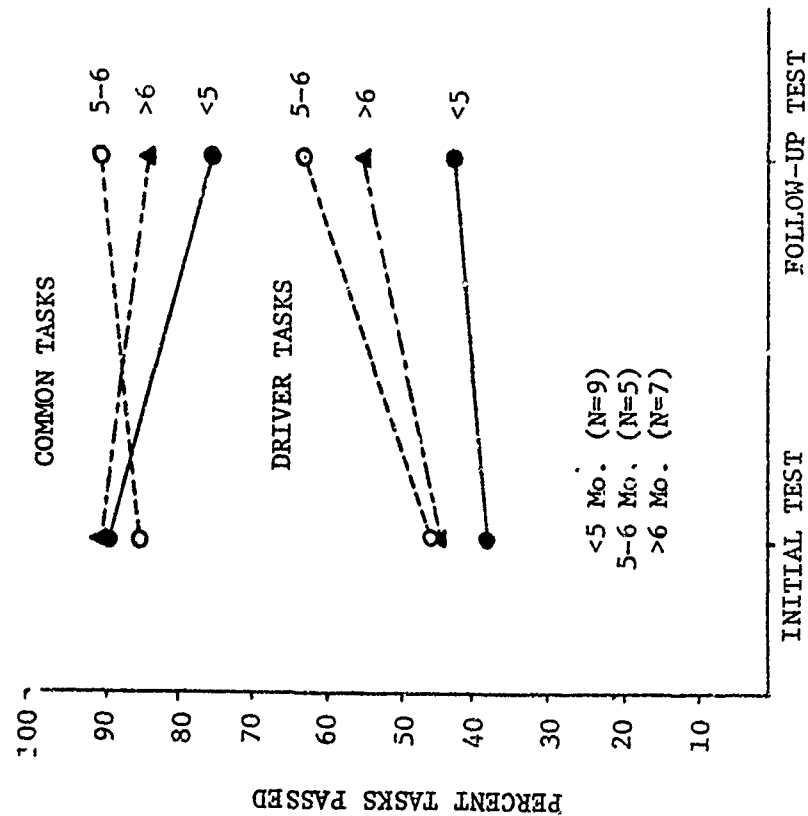


Figure 4. Mean percent of tasks passed by trained drivers assigned as drivers as a function of test period and retention interval (months) for two types of tasks.

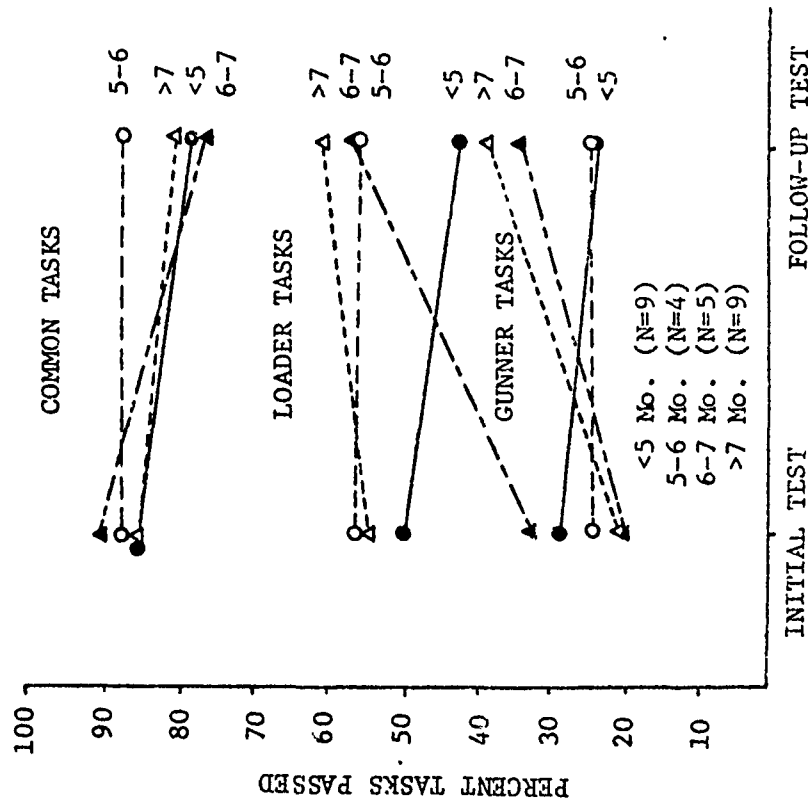


Figure 5. Mean percent of tasks passed by trained gunner/loaders assigned as gunner/loaders as a function of test period and retention interval (months) for three types of tasks.

Follow-up test performance on driver tasks appears to increase more as a function of initial performance level than it does of time on the job; but even this trend is reversed for the loader and gunner tasks.

Since none of these trends by retention interval may be considered statistically reliable,¹ the best guess is that they reflect specific but undefined differences in the character of AIT during the periods in which these groups were trained.

PERFORMANCE ON TASK ELEMENTS

As noted earlier, task performance may be measured in two ways: (1) percent of soldiers passing a task (correctly performing all elements or performance measures² of a task), or (2) average percent of task elements passed. Soldiers who fail a task receive a "NO-GO" or zero score regardless of whether they failed one, two or all of the task elements. Thus, percent of soldiers passing a task provides a measure, albeit conservative, that is indicative of full proficiency or readiness on the task; that score is the one used in the previous analyses. On the other hand, average percent of task elements passed, or its variant, the percent of examinees passing each element, provides a measure more descriptive of the degree of departure from full proficiency.

Since the latter is especially useful in interpreting causes of overall task failure, pass rates were computed by performance measure for each task. Data for six sample tasks are presented in Tables 10 through 13 and for all tasks in Appendix E.

The data are displayed so the reader can compare by task the level and distribution of element pass rates to the overall percent passing all elements. Comparisons should be made with two points of arithmetic in mind: one is that the overall pass rate can be no greater than the smallest percent passing any element; and second, the extent to which the overall task pass rate falls below the lowest element rate depends on, (a) failure rate on the other elements, and (b) the extent to which failure rates over elements are attributable to many crewmen (each missing a few) rather than a few (each missing many).

¹ANOVA Tables D.4 and D.5, Appendix D.

²Despite subtle differences in meaning when strictly defined, the three terms, task element, performance measure and step in task performance, are used here interchangeably.

So in looking for causes of low performance on a task, the first point of interest is the distribution of element failure rates--i.e., is the low percent pass on the whole task associated with a level pattern of failure on the elements, or is it attributable to a high failure rate on one or two of the elements? This is an important distinction since the percent pass for a task is chiefly determined by performance on the task element most frequently failed; and it is of interest to trainers to know if low task proficiency was due to poor performance on all aspects of the task or on one or two specific task elements. These two cases are contrasted in Tables 10 and 11. Failure rates, though higher on the pretest, were stable over steps in breechblock disassembly (Table 10) for both test administrations and represented well the overall task pass rate. For the task "Adjust Track Tension," on the other hand, failure rates on the elements tend not to reflect the overall task pass rate (Table 11). Notice especially that while only 42% of the crewmen passed the pretest, 70% or more performed three of the four elements correctly--that only 47% were proficient on the remaining element was the primary cause of the low pass rate overall.

A second and more worthy point of note in these data is the character of the most-frequently-failed element. Since performance on the most frequently-failed element sets the upper limit for percent passing the task, and since the low pass rate on several tasks was due to low performance on but one or two elements, the characteristics of these elements were inspected.

In evaluating the most-frequently failed elements it is useful to attempt to distinguish two types. The first is the type of element failed because it is apparently the most difficult or skilled aspect of the task. An example of this is shown in Table 11 where low task performance was attributable largely to the high incidence of failure on the step requiring an adjustment of track tension to precise tolerance.

The other general category of failure is that in which the relevance of the element to the task as tested is questionable or unclear to the crewman. In other words, the school instructor, the field trainer, and the test developer may differ in prescribing the steps in task performance. A soldier who learns one fixed task procedure may later fail a test of that task simply because the test contained a task element that had been slighted or omitted in training. This seems to occur most frequently with two types of task elements: those that bound the task (i.e., the first and last in the procedure), and those that involve essentially passive behavior (certain types of safety precautions or visual checks). Elements of the first type may be overlooked by an examinee simply because the start and stop points for a task are sometimes arbitrary--or may seem so, at least, to an examinee who makes certain implicit assumptions about what has already been accomplished leading up to task performance or when he has done enough to consider the task completed. Possible examples of this effect are shown in Table 12.

Table 10

Sample Test Results Illustrating Task Element Pass Rates
That Are Uniform and Representative of Overall Task Performance

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
DISASSEMBLE MAIN GUN BREECHBLOCK.	60	60	<u>40</u>	<u>73</u>
. Depressed firing contact plate plunger and turned firing contact plate counterclockwise until arrows on plate and breechblock were alined with each other			42	73
. Removed firing contact plate, firing contact plate plunger, and spring . .			42	75
. Removed plastic washer, firing contact, and firing contact sleeve.			40	75
. Removed retractor pivot pin and firing pin retractor from retrac- tor guide			42	77
. Removed screw, washers, and clamp securing the retractor driver to the bottom of the breechblock. (Use Allen wrench to remove screws)			42	77
. Removed retractor driver, retractor driver shaft, and spring.			42	77

Table 11

Sample Test Results Illustrating How Disproportionately Low
Performance on One Task Element Affects Overall Task Pass Rate

TASK AND TASK ELEMENTS	<u>N</u>		% Pass	
	PRE	POST	PRE	POST
ADJUST TRACK TENSION.	60	60	<u>42</u>	<u>39</u>
. Removed the track and adjusting link screw and washer from the top of the track adjusting link.			72	83
. Used the track adjusting wrench on the track adjusting link and pulled up to increase track tension (right side) or pushed down to decrease track tension (right side). (Reversed directions for the left side.) [Track adjusting link must not extend beyond the red painted groove.].			73	61
. Adjusted track tension to 1/4 - 5/16 inch in tolerance			(47)	52
. Installed lockwasher and lockscrew and tightened with wrench until fully seated on the shoulder.			70	71

Table 12

Sample Test Results Illustrating Disproportionately Low
Performance on Either the First or Last Task Element

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
UNLOAD MISFIRED MAIN GUN ROUND.	60	60	<u>32</u>	<u>17</u>
. Told Gunner to turn main gun turret power switches OFF.			(32)	(30)
. Placed firing safety switch in SAFE position.			95	90
. Opened breech			97	93
. Held breech operating handle down while TC (Gunner) pried round out of chamber			98	42
. Returned breech operating handle to latched position.			97	73
LOADS MAIN GUN IN RESPONSE TO FIRE COM- MANDS BATTLESIGHT, SABOT LOADED	60	60	<u>46</u>	<u>45</u>
. Stood clear of path of recoil			97	97
. Placed firing safety switch in FIRE . .			93	83
. Announced "UP".			98	97
. Prepared to load a second round in case no "CEASE FIRE" is given.			(46)	(49)
CHECK OPERATION OF M3 HEATER (GAS PAR- TICULATE UNIT).	60	60	<u>20</u>	<u>22</u>
On Driver's request, "CHECK GAS PAR- TICULATE UNIT":				
. Rotated air heater knob to ON			83	82
. Check air flow through hose			77	72
. Allowed air to warm up for at least five minutes.			60	38
. Adjusted protective mask and attached air hose.			82	65
. Removed and stowed air hose and protec- tive mask			82	65
. Rotated air heater switch to OFF. . . .			62	70
. Reported status of M3 Heater to driver.			(38)	(47)

Elements of the second type, those involving possible behavior or safety precautions, often result in lower scores either because they are considered relatively unimportant by the experienced crewman (at least considered unnecessary in the test situation), or because they are difficult to observe and score by the tester. Results for the task shown in Table 13 include one or two possible examples. The first element, "Waited 5 seconds to allow for a hang-fire," is a safety precaution which, though observed reasonably well at the end of training (73% on the Pre-test), was unheeded by most crewmen in the field (32% on the Post-test)--and, in fact, anecdotal evidence indicates that it is typically ignored in practice. The element, "Placed safety in FIRE and hand functioned the weapon one cycle," may be similarly described. Other examples of low performance on passive elements of task performance may be seen in results for the first aid tasks (Appendix E, Table E.4) where pass rates tended to be lower on steps requiring the soldier to avoid doing something that might aggravate the victim's condition.

The foregoing points are emphasized to aid the reader in examining the detailed test results presented in Appendix E. As important as it is to understand the various causes of low task performance, they do not yet appear sufficiently clear or systematic to permit orderly analysis. It is suspected, however, that all shifts in test performance from school to field are not attributable to retention. Some may be the result of, or at least moderated by, changes in training or testing doctrine coincidental with the measurement period.

Table 13

Sample Test Results Illustrating Low Performance On
Task Elements Involving Passive Behavior

TASK AND TASK ELEMENTS	<u>N</u>		% Pass	
	PRE	POST	PRE	POST
APPLY IMMEDIATE ACTION TO REDUCE STOPPAGE OF AN M219 MACHINEGUN.	60	34	<u>35</u>	<u>8</u>
On Command "STOPPAGE":				
. Waited 5 seconds to allow for a hangfire.			73	(32)
. Charged the machinegun, locking the recoiling parts to the rear			98	88
. Checked to see if the ammunition is feeding into the weapon			(45)	91
. Announced "UP".			100	94
On Command "STOPPAGE":				
. Pulled barrel extension to the rear . .			100	65
. Placed safety in SAFE			98	85
. Raised cover and removed the ammuni- tion.			97	91
. Removed "misfired" round from chamber .			88	88
. Placed safety in FIRE and hand func- tioned the weapon one cycle			90	(35)
. Reloaded the weapon			97	85
. Announced "UP".			100	88

DISCUSSION

OVERALL PERFORMANCE

If one disregards type of task and possible changes in performance over time, trained drivers were more proficient overall than the gunner/loaders (Figure 1). This apparent difference is explained however when performance by type of task is compared for the two crewman groups. Pass rates shown in Figures 2 and 3 indicate that low performance on gunner tasks was what attenuated overall gunner/loader proficiency. Drivers and gunner/loaders both averaged about 85% on the common tasks and about 45%-50% on tasks considered primary to their respective crew positions (driver tasks for the drivers and loader tasks for the gunner/loaders). That proficiency is so low (approximately 25%) on gunner tasks is not unexpected when one considers the limitations of training time and probable job assignment for 19E trainees. Two interpretations--neither exclusive of the other, and both reasonable--may be offered: one is that gunner tasks are more difficult to learn than loader tasks; the other is that OSUT managers, acknowledging the reality that most 19E graduates will be assigned as loaders in the field, emphasize loader tasks during training.

Superior performance on common tasks by all crewmen is less easily explained. One is tempted to assume that these were tasks learned in the early, basic phase of OSUT and practiced throughout the training cycle, thus producing greater proficiency. But only the two first-aid tasks were learned early in training, and these were not formally exercised again. The remaining ten common tasks--all of which pertained to the .45 pistol and the submachinegun--were trained later in OSUT. Though time and amount of training suggest no reason for the high level of common task proficiency, the quality of training may. Sufficient equipment is available in OSUT for each trainee to practice individually the disassembly, assembly, clearing and loading of small arms. Since this kind of individual hands-on practice is not typically provided on tank-related tasks, the relatively higher proficiency on the common tasks may be attributable to training method. This hypothesis is strengthened by the near 90% pass rates on M219 (coax) tasks, loader tasks for which training is more thoroughly individualized and performance based than, for instance, breechblock disassembly or track adjustment.

RETENTION

When collapsed over type of task the data show no change in percent of tasks passed from the first testing to the second (Figure 1)

for either crewman group, a result which runs counter to the overall decline in retention reported in the three similar studies mentioned earlier (McCluskey and Schmidt, 1978; Shields, et al., 1978; Baker and Winograd, 1957). Separating common tasks from those specific to a job position, however, produced a different picture: performance declined on common tasks and increased on job specific tasks (Figures 2 and 3). The most appealing explanation of these contrasting shifts in retention is that proficiency increased on driver and gunner/loader tasks because they were practiced in connection with crewmen's normal duties; whereas proficiency fell off on the so-called common tasks (first aid, operation and maintenance of small arms), since they are actually peripheral to the tank crewman's primary duties and were therefore exercised infrequently, if at all, in the early months of unit assignment. As reasonable as this interpretation may seem, it is subject to question on three grounds. First, there is no reliable data on how often the various tasks were practiced in the field. Second, given the high level of initial performance on common tasks, it is possible that a ceiling effect contributed to the lower proficiency found in follow-up testing.¹ And third, that soldiers not assigned to their trained position tended to do as well on retesting as those correctly assigned (Figures 2 and 3) suggests that field practice--to whatever extent it occurred--was not necessarily responsible for the gain in proficiency on job related tasks. All of these considerations, taken together with the fact that different testers were used in the initial and follow-up stages, make intelligent speculation about the nature of skill retention difficult.

Moreover, retention was shown to have little or no consistent relationship to the various time intervals between pre- and post-testing. While there was some indication that crewmen with less than five months of field duty tended to score lower on retesting than those with more time on the job, crewmen in the longest interval (seven months or more) did not typically show the most improvement. The muddled picture of performance and retention interval may have resulted in part from the confounding of interval and OSUT graduating class. As a natural consequence of the study design, early classes tended to be those with the longer time interval before retesting and the later classes those with shorter interval (a dependency that varied some as a result of where a person appeared in the schedule for retesting). And since Armor OSUT was being revised over the period spanned by the ten classes tested, differences in performance effected by training revisions are confounded with effects of retention interval.

¹Considering measurement error only, the nearer to 100% the initial performance, the greater the chance of a decline on retesting.

The range of retention intervals used may also have been a limiting factor. Four to eight months may not be sufficient to produce real differences in skill retention. Skill decay over time may be offset in varying degrees by the frequency of practice, a variable of unmeasured influence in the present study.

These shortcomings aside, the overall trend of the retention data indicates that no real loss in skill proficiency occurs from four to eight months after formal training--a result that stands in contrast to data reported in other Army studies (McCluskey and Schmidt, 1978; Shields, et al., 1978; Baker and Winograd, 1957).

The variability of results in field studies of skill retention is attributable no doubt to procedural factors that in any given study are poorly controlled. This experiment was no exception. Retention interval was varied but found to have no reliable influence on shifts in proficiency, possibly because the amount and kind of intervening practice was uncontrolled. Retention was examined as a function of job assignment and found to change in much the same way regardless of apparent differences in relevance of a crewman's job position. Differences in retention trends were found for two categories of tasks, those common to all crew positions versus those specific to a trained specialty, but the differences could be attributable to any of three factors: 1) behavioral characteristics of tasks unique to each category; 2) the amount of practice that took place on the job for tasks in each category; or, 3) the substantial difference in level of initial learning for each task category.

Results of retention studies are further complicated perhaps by interactions among changes in proficiency and various task or procedural variables. This possibility was suggested in the extremely low correlation between initial and follow-up performance for all groups tested (Appendix D, Table D.6). This apparent unreliability may have been caused not only by unspecified interactions among such factors as initial performance level, time on the job, amount of practice and job assignment, but by variations in the way tasks are performed after a period of time in a field unit. As described earlier, the perceived importance of certain elements of tasks may change from the school setting to the field. Such changes in task "requirements," if unnoticed, can have disruptive and unpredictable effects on "GO/NO-GO" measures of task proficiency.

Finally, there are in field experiments of this sort specific matters of procedure that can and should be controlled, but which tend to give way to practical constraints. Using different scorers for initial and follow-up phases was an unfortunate but necessary compromise. The fact that all were trained and supervised by one of the project staff does not have the stabilizing effect on the data

that a single dedicated corps of scorers would have. The substantial examinee attrition is another matter of concern. Longitudinal experiments, while generally more powerful than cross-sectional designs, have the inherent problem of securing participants for post-testing. The greater the attrition the greater the uncertainty regarding the representativeness of those tested in follow-up. Overcoming such procedural problems is especially difficult in Army field studies where data collecting must be engineered around scheduled operations of greater priority.

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APPENDIX A
TANK CREWMAN READINESS TESTS

TANK CREWMAN READINESS TEST

DRIVER
STATION 1

NAME _____

SSAN _____

SCORER NAME _____

DATE _____

TANK CREWMAN READINESS TEST

DRIVER

STATION 1

CONDITIONS. Fully operational M60A1 situated on level ground with main gun over rear deck and drain valves open. Tank has following deficiencies: track tension loose; M24 and M27 periscopes dirty.

INSTRUCTIONS TO DRIVER. "Prepare the tank for driving on a night mission in an NBC environment. Your activities will include (read list of tasks). Perform each task when I instruct you to do so. You may use your TM. I will observe your performance and serve as the other crew members as needed. Do you have any questions? Work quickly, but carefully. Ready... begin."

TASKS.

1. Perform before-operation checks and services on M27 periscope.
2. Remove M27 periscope.
3. Perform before-operation checks and services on M24 (IR) periscope.
4. Install M24 (IR) periscope.
5. Place M24 (IR) periscope into operation.
6. Perform before-operation checks and services on the gas particulate unit.
7. Perform main gun prepare-to-fire checks from Driver's station.
8. Check track tension (Driver requirements.)

PERFORMANCE MEASURES.

	<u>Yes</u>	<u>No</u>
1. PERFORM BEFORE-OPERATION MAINTENANCE CHECKS AND SERVICES ON THE M27 PERISCOPE.		
. Inspected M27 periscope and spare for cracks and dirty lenses.	___	___
. Cleaned dirty lenses.	___	___
2. REMOVE THE M27 PERISCOPE.		
. Loosened wing nuts on both sides of the periscope.	___	___
. Rotated retainers until clear of the periscope mounting lugs.	___	___
. Removed periscope from the bracket.	___	___

	<u>Yes</u>	<u>No</u>
3. PERFORM BEFORE-OPERATION MAINTENANCE CHECKS AND SERVICES ON THE M24 (IR) PERISCOPE.		
. Pulled periscope holder lid handle down.	___	___
. Opened lid.	___	___
. Unlatched both catches on IR periscope stowage box.	___	___
. Removed the periscope from stowage box.	___	___
. Inspected the M24 (IR) periscope and spare head for cracked or dirty lenses and completeness.	___	___
. Cleaned dirty lenses.	___	___
4. INSTALL THE M24 (IR) PERISCOPE.		
. Closed the Driver's hatch.	___	___
. Placed the Master Battery switch in the OFF position.	___	___
. Instructed crew member to rotate the turret so the gun tube is forward.	___	___
. Pulled up (rearward) on the elevation adjustment lever to insure bind (tension) has been released on elevation clamp and elevation clamp pivots.	___	___
. Loosened the jam nut on the front (forward) inside of the elevation clamp.	___	___
. Positioned the periscope in the periscope holder.	___	___
. Pushed up on periscope until it locked in the holder. (Insured the periscope was locked in the holder before released.)	___	___
. Insured the elevation clamp is positioned in the periscope holder detent.	___	___
. Tightened the adjustment screw on the front right hand inside of the elevation clamp until the elevation clamp was firmly seated in the periscope holder detent.	___	___
. Tightened the elevation clamp adjustment screw jam nut.	___	___
. Pushed elevation adjustment lever downward (forward) and locked periscope.	___	___
. Unscrewed dust cap from power receptacle (center) location.	___	___
. Unscrewed power cable connecting plug from stowage receptacle on right-hand side of compartment.	___	___
. Threaded power cable connecting plug into periscope receptacle and hand tightened.	___	___
. CONFIRM: Soldier did not expose periscope to direct sunlight.	___	___
5. PLACE THE M24 (IR) PERISCOPE INTO OPERATION.		
. Turned the Master Battery switch ON.	___	___
. Placed the Blackout Selector switch in BO DRIVE.	___	___

	<u>Yes</u>	<u>No</u>
. Turned the IR switch ON.	___	___
. Turned the Lighting Control switch handle to the left.	___	___
. Pulled the elevation adjustment lever up.	___	___
. Adjusted periscope elevation angle to a comfortable position.	___	___
. Pushed elevation adjustment lever down to lock the periscope in position.	___	___
. Loosened the two inner wingnuts on the headrest until the proper eye distance is obtained, then retightened (handtight) both wingnuts.	___	___
. Bent headrest to fit head contour by pulling, pushing, or twisting on each side of the headrest.	___	___
. Allowed periscope to warm up for 5 minutes before adjusting focus.	___	___
. Unscrewed left and right dust caps from bottom focus controls.	___	___
. Rotated left and right focus control knobs until the view through each eyepiece appeared with maximum sharpness.	___	___
. Screwed left and right dust covers back over focus control knobs and tightened finger tight.	___	___
6. PERFORM BEFORE-OPERATIONS CHECKS AND SERVICES ON THE GAS PARTICULATE UNIT.		
. Inspected precleaner, particulate filter unit, housing, gas filter cannisters and air heater for dents, missing or loose control knob, pinched or blocked air hose.	___	___
. Wiped precleaner, particulate filter unit housing, gas filter cannisters and air heater clean with a damp rag.	___	___
. Tightened hose assemblies and electrical cables.	___	___
. Removed spring clip from air inlet openings.	___	___
. Turned Gas Particulate switch ON.	___	___
. Disconnected air duct hose from Driver's orifice connector and checked air flow.	___	___
. Rotated air heater knob to ON and checked for indicator lamp operation.	___	___
. Checked air flow through the hose.	___	___
. Allowed air to warm up at least five minutes.	___	___
. Checked air temperature.	___	___
. Adjusted protective mask and attached air hose.	___	___
. Requested other crew members to check gas particulate operation.	___	___
. Removed and stowed air hose and protective mask.	___	___

	<u>Yes</u>	<u>No</u>
. Rotated air heater knob to OFF.	_____	_____
. Turned Gas Particulate switch OFF.	_____	_____
. Replaced spring clip to air inlet openings.	_____	_____
7. PERFORM PREPARE-TO-FIRE CHECKS FROM DRIVER'S STATION		
. Started engine on TC's command, "CHECK FIRING SWITCHES."	_____	_____
. Reported "DRIVER READY" on TC's command, "REPORT".	_____	_____
8. CHECK TRACK TENSION.		
. Moved vehicle forward on level hard surface, and when signaled by Loader, coasted to a stop without applying brakes.	_____	_____
. Make final forward adjustments (without applying brakes) in response to Loader signals.	_____	_____

SCORING.

To pass, a soldier must have:

- a. Installed the M24 (IR) periscope without exposing it to direct sunlight. (CONFIRM - "NO")
- b. Been checked "YES" on each performance item.

PASS FAIL

TANK CREWMAN READINESS TEST

LOADER/GUNNER
STATION 1

NAME _____

SSAN _ _ _ _ _

SCORER NAME _____

DATE _____

TANK CREWMAN READINESS TEST

LOADER/GUNNER

STATION 1

CONDITIONS. M60A1 tank complete with BII, situated on level ground. An ammunition stowage plan and dummy rounds (including 3 APDS, 3 HEP, 2 HEAT and 1 APERS) are located next to tank. All ammunition stowage areas are blocked off with exception of 7 slots in the ready rack, 1 slot in the tubular stowage rack and 1 in the turret bustle; empty slots should correspond to stowage plan and types of dummy rounds. Tank has track tension loose. Dummy 7.62 mm round loaded by hand in chamber of coax with belt of dummy rounds loaded on top so that chambered round won't extract when weapon is charged. Rounds will be passed to the loader base down unless told otherwise by the loader.

INSTRUCTIONS TO LOADER/GUNNER. "This test will be given in three parts.

Part 1 is a test of your ability to prepare the tank for a combat mission in an NBC environment; part 2 tests your ability to perform the duties of a loader under simulated conditions of an extended fire mission; in part 3 you will perform the duties of a gunner to prepare the tank for a tactical mission. During part 1, you are to perform the following loader tasks:

1. Perform before-operations checks and services on engine and transmission oil levels. (I will ask you whether the oil levels are acceptable.)
2. Check track tension.
3. Adjust track tension.
4. Check operation of M3 heater (gas particulate unit).
5. Stow main gun rounds.

I realize you would normally perform some additional tasks as the loader in this situation, but these are the ones you are being tested on today. Perform each task when I instruct you to do so. You may use your TM. I will observe your performance and serve as the other crew members as needed. Do you have any questions? Work quickly, but carefully. Ready... begin."

PART ONE

PERFORMANCE MEASURES.

Yes No

1. PERFORM BEFORE-OPERATIONS CHECKS AND SERVICES ON TANK ENGINE AND TRANSMISSION OIL LEVELS.

- | | | |
|--|-----|-----|
| . Checked engine oil level. | ___ | ___ |
| . Responded correctly when asked if engine oil level was acceptable. | ___ | ___ |
| . Checked transmission oil level. | ___ | ___ |
| . Responded correctly when asked if transmission oil level was acceptable. | ___ | ___ |
| . Told Driver to start engine and idle at 700-750 RPM. | ___ | ___ |
| . Waited until engine was warm. | ___ | ___ |

	<u>Yes</u>	<u>No</u>
. Checked engine oil level.	—	—
. Responded correctly when asked if engine oil level was acceptable.	—	—
. Checked transmission oil level.	—	—
. Responded correctly when asked if transmission oil level was acceptable.	—	—
2. CHECK TRACK TENSION.		
. Directed Driver to coast to a stop so that a track link was centered on the #2 and #3 support roller.	—	—
. Coordinated with Driver by arm and hand signals so that tank coasted to a stop with track link in proper position.	—	—
. Raised the track with a crowbar at the number two support roller and placed a block (1" thick by 6" square) between the number two support roller and the track link.	—	—
. Place a string or straight edge on the #2 and #3 support rollers.	—	—
. Measured the clearance between the bottom of the track and the top of string or straight edge midway between support rollers: Acceptable clearance is 1/4 to 5/16 inch (midway between Nos. 2 and 3 support rollers).	—	—
3. ADJUST TRACK TENSION.		
. Removed the track and adjusting link screw and washer from the top of the track adjusting link.	—	—
. Used the track adjusting wrench on the track adjusting link and pulled up to increase track tension (right side) or pushed down to decrease track tension (right side). (Reversed directions for the left side.) [Track adjusting link must not extend beyond the red painted groove.]	—	—
. Adjusted track tension to 1/4-5/16 inch in tolerance.	—	—
. Installed lockwasher and lockscrew and tightened with wrench until fully seated on the shoulder.	—	—
4. CHECK OPERATION OF M3 HEATER (GAS PARTICULATE UNIT).		
On Driver's request, "CHECK GAS PARTICULATE UNIT":		
. Rotated air heater knob to ON.	—	—
. Checked air flow through hose.	—	—
. Allowed air to warm up for at least five minutes.	—	—
. Adjusted protective mask and attached air hose.	—	—
. Removed and stowed air hose and protective mask.	—	—
. Rotated air heater switch to OFF.	—	—
. Reported status of M3 Heater to the driver.	—	—

	<u>Yes</u>	<u>No</u>
5. STOW MAIN GUN ROUNDS IN THE TANK.		
. Determined, by reference to Ammunition Stowage Plan and present load, how many of each type of round is needed.	—	—
. Called out to assisting crewman how many of a given type of round is wanted.	—	—
. Insisted that round be handed in through turret nose down.	—	—
. Stowed round in:		
- Ready rack by placing primer end down, swinging hinge of holder up and to the left, pulling out spring loaded knob on rod of holder, sliding hinge slot over rod behind knob, and releasing the knob.	—	—
- Tubular stowage rack by pushing round in nose first, swinging handle lock over primer end of round, and rotating handle lock securely in place.	—	—
- Turret bustle by seating round with nose toward inside of turret, swinging hinge up and to the left, pulling up clamp and slotting hinge in place below clamp, and pulling clamp down.	—	—
. Completed stowage of rounds one type at a time.	—	—

PART TWO

INSTRUCTIONS TO LOADER/GUNNER. "Remember, Part 2 is a test of your ability to perform the duties of a loader under simulated conditions of an extended fire mission. We will be carrying APDS in the tube for battlesight engagements, so you will begin by loading a SABOT round. From then on, listen to the fire commands and react accordingly. Since you will be working with dummy rounds, you will have to unload rounds between firings. But wait until I give you the command to unload, then quickly remove the round and be ready for the next command. O.K...., take up your position in the Loader's Station and load a round of SABOT. I will observe your performance and serve as the other crew members as needed. Do you have any questions? Work quickly, but carefully. Ready... begin."

TASKS.

6. Load main gun in response to fire commands.
7. Ready coax in response to fire commands.
8. Rotate round in main gun misfire procedure.
9. Unload misfired main gun round.
10. Apply immediate action to reduce stoppage of an M219 machinegun.

NOTES.

- a. For Performance Measures 6 and 7, give the following fire commands, at about 15 second intervals:
 1. Gunner, SABOT tank.
 2. Gunner, HEP, antitank.
 3. Gunner, HEAT, tank.
 4. Gunner, COAX, troops.
 5. Gunner, HEP, antitank,... MISFIRE.

Note. Reload SABOT for battlesight.

 6. Gunner, BEEHIVE, TIME 1000 METERS troops.
 7. Gunner, SABOT, tank (No "CEASE FIRE").
 8. Gunner, SABOT, tank.
 9. Gunner, HEAT, tank.
 10. Gunner, COAX, troops,... STOPPAGE.
- b. The MISFIRE command provides a break in the sequence. After you go through MISFIRE checks, tell Loader to rotate the round. Next, tell Loader to unload the round, and assist him in doing so.
- c. Loading should be timed with a stop watch. Timing should begin with announcement of ammunition element and end with Loader's announcement of "UP". Time should be cumulated for each series of five commands.

Yes No

PERFORMANCE MEASURES.

6. LOADS MAIN GUN IN RESPONSE TO FIRE COMMANDS.

- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| <ol style="list-style-type: none"> a. Battlesight, SABOT Loaded. <ul style="list-style-type: none"> . Stood clear of path of recoil. . Placed firing safety switch in FIRE. . Announced "UP". . Prepared to load a second round in case no "CEASE FIRE" is given. b. Main Gun Not Loaded. <ul style="list-style-type: none"> . Placed firing safety switch in SAFE position. . [Check replenisher tape.] . Opened breech. . Selected announced ammunition. . Unlocked ammunition ready rack. . [Set range on APERS ammunition fuze when "BEEHIVE TIME" is announced in fire command.] . Inserted appropriate round into chamber by placing the round 2/3rds into chamber and pushing it the rest of the way with the heel of the fist, swinging arm up and away from closing breech. . Stood clear of path of recoil. . Placed firing safety switch in FIRE position. . Announced "UP". | <table border="0" style="width: 100%;"> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> </table> | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| _____ | _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| _____ | _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

	<u>Yes</u>	<u>No</u>
. Prepared to load a second round in case no "CEASE FIRE" is given.	---	---
c. SABOT Loaded, Different Ammunition Element Given.		
. Placed firing safety switch in SAFE position.	---	---
. [Checked replenisher tape.]	---	---
. Unloaded SABOT round.	---	---
. Placed and locked SABOT round in ready rack.	---	---
. Selected announced ammunition.	---	---
. Unlocked ammunition ready rack.	---	---
. [Set range on APERS ammunition fuze when "BEEHIVE TIME" is announced in fire command.]	---	---
. Inserted appropriate round into chamber by placing round 2/3rds into chamber, and pushing it the rest of the way with the heel of the fist, swinging arm up and away from closing breech.	---	---
. Stood clear of path of recoil.	---	---
. Placed firing safety switch in FIRE position.	---	---
. Announced "UP".	---	---
. Prepared to load a second round in case no "CEASE FIRE" is given.	---	---
7. READY COAX IN RESPONSE TO FIRE COMMANDS.		
. Placed coax safety in FIRE position.	---	---
. Announced "UP".	---	---
8. ROTATED ROUND IN MAIN GUN MISFIRE PROCEDURE.		
On Gunner's command "ROTATE ROUND":		
. Placed firing safety switch in SAFE position.	---	---
. Opened breech slowly enough to extract round about 1/2 way.	---	---
. Rotated round 1/2 turn.	---	---
. Pushed round into chamber with heel of the fist, swinging arm up and away from closing breech.	---	---
. Stood clear of path of recoil.	---	---
. Placed firing safety switch in FIRE position.	---	---
. Announced "UP."	---	---
9. UNLOAD MISFIRED MAIN GUN ROUND.		
. Told Gunner to turn main gun turret power switches OFF.	---	---
. Placed firing safety switch in SAFE position.	---	---
. Opened breech.	---	---
. Held breech operating handle down while TC (Gunner) pried round out of chamber.	---	---
. Returned breech operating handle to latched position.	---	---

10. APPLY IMMEDIATE ACTION TO REDUCE STOPPAGE OF AN M219 MACHINEGUN.

Yes No

On Command "STOPPAGE":

- . Waited 5 seconds to allow for a hangfire.
- . Charged the machinegun, locking the recoiling parts to the rear.
- . Checked to see if the ammunition is feeding into the weapon.
- . Announced "UP."

___ ___
___ ___
___ ___
___ ___

On Command "STOPPAGE":

- . Pulled barrel extension to the rear.
- . Placed safety in SAFE.
- . Raised cover and removed the ammunition.
- . Removed "misfired" round from chamber.
- . Placed safety in FIRE and hand functioned the weapon one cycle.
- . Reloaded the weapon.
- . Announced "UP."

___ ___
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PART THREE

INSTRUCTIONS TO LOADER/GUNNER. "In Part 3 of this test, you will perform the following tasks from the Gunner's station to prepare the tank for a tactical mission in a nuclear environment:

11. Check operation of M3 heater (gas particulate unit).
12. Charge manual elevation system.
13. Prepare Gunner's telescope for operation.
14. Prepare Gunner's periscope for daylight operation.

Perform each task when I instruct you to do so. You may use your TM. I will observe your performance and serve as other crew members as needed. Do you have any questions? Work quickly, but carefully. Ready... begin."

Yes No

PERFORMANCE MEASURES.

11. CHECK OPERATION OF M3 HEATER.

On Driver's request, "CHECK GAS PARTICULATE UNIT":

- . Rotated air heater knob to ON and check for Indicator lamp operation.
- . Checked air flow through hose.
- . Allowed air to warm up for at least five minutes.
- . Checked air temperature.
- . Adjusted protective mask and attached air hose.
- . Removed and stowed air hose and protective mask.
- . Rotated air heater switch to OFF and listened for audible click.
- . Reported status of M3 heater to Driver.

___ ___
___ ___
___ ___
___ ___
___ ___
___ ___
___ ___
___ ___

12. CHARGE MANUAL ELEVATION SYSTEM.

Yes No

- . Rotated the manual elevation handle to depress the main gun until the handle could no longer be rotated with one hand.

13. PREPARE GUNNER'S TELESCOPE FOR OPERATION.

- . Tightened eyepiece hanger and screws.
- . Seated pin on the telescope and the slot on the holder assembly.
- . Adjusted headrest by loosening adjusting nut and sliding headrest to desired position and tightening nut.
- . Cleaned lenses.
- . Focused eyepiece by rotating diopter to the maximum plus reading and then rotating back.
- . Set reticle illumination by rotating the rheostat knob on instrument light M50.
- . Removed filters from filter box.
- . Attached filter to telescope eyepiece.
- . Viewed through eyepiece and moved reticle selector to each position checking to see that both reticles are visible.

14. PREPARE GUNNER'S PERISCOPE FOR DAYLIGHT OPERATION.

- . Adjusted the daylight and IR headrest for proper fit.
- . Opened ballistic shield.
- . Adjusted diopter on the daylight sight by rotating the diopter to the maximum-plus reading and then back.
- . Set the reticle illumination by rotating the light source control knob until reticle appears with desired brightness.

SCORING.

To pass, soldier must have:

- a. Correctly responded to engine and transmission dip stick reading.
- b. Detected that track tension was loose and adjusted it.
- c. Stowed dummy rounds according to ammunition stowage plan
- d. Executed the first five fire commands in a total time of 35 seconds, and the second five commands (five loading reactions) in 1 minute 35 seconds.

Elapsed Time:

Commands 1 - 5 _____ seconds
Commands 6 - 10 _____ seconds

- e. Responded to "MISFIRE", including unloading the misfired round, within 2 1/2 minutes.
Elapsed Time: _____ seconds
- f. Responded to STOPPAGE by removing misfired round within 10 seconds of command, and completing procedure within 15 seconds.
Elapsed Time:
 Removed round _____ seconds
 Announced UP _____ seconds
- g. Selected the correct round in response to each fire command.
- h. Checked replenisher tape at least once during the test.
- i. Correctly responded to replenisher reading.
 . Added oil if tape indicated two rough edges.
 . Continued to load if tape indicated one rough and one smooth edge.
 . Drained oil if tape indicated two smooth edges.
- j. Set correct range on BEEHIVE round.
- k. Been checked "YES" on each performance measure.

PASS FAIL

TANK CREWMAN READINESS TEST

LOADER/GUNNER
STATION 2

NAME _____

SSAN _____

SCORER NAME _____

DATE _____

TANK CREWMAN READINESS TEST

LOADER/GUNNER

STATION 2

CONDITIONS. Fully operational M60A1 situated on level ground. The M219 machinegun is mounted and loaded with dummy ammunition. A complete gun-tool roll is stowed according to unit loading plan. Boresight panel is at appropriate range (1200 meters). Gun tube is above horizontal.

INSTRUCTIONS TO LOADER/GUNNER. "During this test you will perform some loader tasks. As the loader, you are to clear, remove, disassemble, assemble, mount, and load the M219 machinegun, then disassemble and assemble the breechblock. Some of the tasks will be timed. You will have 30 seconds to clear the machinegun, 2 minutes to disassemble the machinegun, and 2 minutes to assemble it. You will have 10 minutes to remove and disassemble the breechblock, and 10 minutes to assemble and install it. Perform each task when I instruct you to do so. I will alert you before I start timing on each of these tasks. I will not assist you during the test. You may use your TM, but remember, you will be timed on some tasks. I will observe your performance and serve as the other crew members as needed. Do you have any questions? Work quickly, but carefully. Ready... begin."

TASKS.

1. Clear M219 machinegun.
2. Remove M219 machinegun from tank.
3. Disassemble M219 machinegun.
4. Assemble M219 machinegun.
5. Check operation of an M219 machinegun.
6. Mount M219 machinegun in tank.
7. Load an M219 machinegun.
8. Disassemble breechblock.
9. Assemble breechblock.

PERFORMANCE MEASURES.

	<u>Yes</u>	<u>No</u>
1. CLEAR AN M219 MACHINEGUN (30 SECONDS).		
. Place safety in FIRE position.	___	___
. Charged weapon to lock moving parts to the rear.	___	___
. Directed gunner to place machinegun switch in the OFF position.	___	___
. Placed safety in the SAFE position.	___	___
. Open cover assembly.	___	___
. Removed ammunition belt from the machinegun.	___	___

	<u>Yes</u>	<u>No</u>
. Raised feed tray.	_____	_____
. Looked for ammunition.	_____	_____
. Place safety in FIRE position.	_____	_____
. Move bolt forward.	_____	_____
. Place safety in SAFE position.	_____	_____
. Close feed tray and cover.	_____	_____

Elapsed Time: _____ seconds.

2. REMOVE M219 MACHINEGUN FROM TANK (NOT TIMED).

. Disconnected electrical lead from solenoid.	_____	_____
. Loosened three support set screws in collar on gun mount cover shield.	_____	_____
. Removed machinegun retainer.	_____	_____
. Removed the machinegun.	_____	_____
. Removed the spent cartridge bag.	_____	_____
. Removed the case ejection shield.	_____	_____

3. DISASSEMBLE M219 MACHINEGUN (2 MINUTES).

. Removed barrel and jacket assembly from receiver.	_____	_____
. Separated barrel from jacket assembly.	_____	_____
. Removed cover assembly.	_____	_____
. Removed feed tray.	_____	_____
. Removed guide rod springs while holding barrel extension forward.	_____	_____
. Separated guide rods from guide rod springs.	_____	_____
. Removed backplate assembly.	_____	_____
. Retracted barrel assembly.	_____	_____
. Depressed buffer support lever and removed barrel extension.	_____	_____
. Removed breechblock from barrel extension assembly.	_____	_____
. Removed retainer clip and charger assembly from projecting stud.	_____	_____

Elapsed Time: _____ seconds.

4. ASSEMBLE M219 MACHINEGUN (2 MINUTES).

. Installed charger assembly.	_____	_____
. Placed breechblock assembly in barrel extension.	_____	_____
. Installed barrel extension.	_____	_____
. Installed backplate assembly.	_____	_____
. Joined guide rods and guide rod springs.	_____	_____
. Installed feed tray.	_____	_____
. Installed cover assembly.	_____	_____
. Joined barrel to the jacket assembly.	_____	_____
. Joined barrel and jacket assembly with the receiver.	_____	_____

Elapsed Time: _____ seconds.

	<u>Yes</u>	<u>No</u>
5. CHECK OPERATION OF M219 MACHINEGUN (NOT TIMED).		
. Placed safety in FIRE position.	---	---
. Charged weapon to lock moving parts to the rear.	---	---
. Allowed barrel extension to ease forward by keeping tension on the charging handle and depressing the manual firing trigger.	---	---
6. MOUNT M219 MACHINEGUN IN TANK (NOT TIMED).		
. Backed-off the three support set screws on the gun mount cover shield flush with the collar of the gun port.	---	---
. Had the gunner depress the gun tube so that it was horizontal or slightly below.	---	---
. Placed the shell ejection shield on the shield support and fastened the six snap fasteners which hold it in place.	---	---
. Installed the spent cartridge bag on the empty cartridge bag support by fastening the eight snap fasteners which hold it in place.	---	---
. Slid the machinegun into the machinegun port until the rearmost portion of the jacket assembly (the disconnecter holes) were flush with the machinegun bracket assembly.	---	---
. Inserted the two cap screws and lock washers in their respective holes and tightened them down.	---	---
. Plugged in the machinegun electrical lead to the solenoid on the machinegun's backplate assembly.	---	---
7. LOAD M219 MACHINEGUN (NOT TIMED).		
. Pushed forward on the rear of the left cover latch rod assembly and raised the cover.	---	---
. Raised the feed tray.	---	---
. Placed the machinegun safety in the FIRE position.	---	---
. Charged (cocked) the machinegun by pulling the charger handle to the rear.	---	---
. Inspected the chamber for obstructions by looking and feeling in the chamber.	---	---
. Placed safety in the SAFE position.	---	---
. Lowered feed tray.	---	---
. Fed ammunition belt through chute of ammunition box.	---	---
. Placed first round of ammunition belt in feed tray slot with the open side of ammunition link loops facing down.	---	---
. Closed machinegun cover assuring that lock rod is engaged.	---	---

	<u>Yes</u>	<u>No</u>
8. DISASSEMBLE MAIN GUN BREECHBLOCK (10 MINUTES).		
a. Removal:		
. Placed the main gun safety switch in the SAFE position.	—	—
. Placed breechblock crank stop in the REAR position.	—	—
. Opened the breech and looked for obstruction.	—	—
. Closed the breech manually by tripping the extractors with an empty cartridge case or a wooden block.	—	—
. Removed firing pin spring by depressing plunger, moving plunger to the right, twisting firing pin spring retainer counter-clockwise until the lug aligned with the groove in the breechblock, and removing the retainer and spring.	—	—
. Removed firing pin and retractor guide with firing pin retractor by inserting screwdriver blade into retractor guide slot and prying outward.	—	—
. Screwed eye bolt into top of breechblock.	—	—
. Suspended chain hoist from hook on the turret ceiling and connected chain hoist to eye bolt.	—	—
. Took up slack with the chain hoist to support breechblock.	—	—
. Applied tension on closing spring by turning adjuster clockwise with spanner wrench.	—	—
. Removed tension from the closing spring by depressing plunger from its notch with a screwdriver and allowing adjuster to turn counterclockwise under control of the spanner wrench.	—	—
. Inserted small screwdriver into hold in breechblock crank stop and slid stop forward.	—	—
. Started breechblock downward by rotating operating handle rearward and down, and with chain hoist let the breechblock begin descending.	—	—
. Returned the operating handle to the latched position.	—	—
. Lowered the breechblock until breechblock crank pivot was free of the T-slot, and removed pivot.	—	—
. Lowered breechblock until breechblock was on the turret floor.	—	—
. Released chain hoist from the eye bolt.	—	—
. Removed right and left extractors from the breech ring.	—	—

- | | <u>Yes</u> | <u>No</u> |
|--|------------|-----------|
| b. Disassembly: | | |
| . Depressed firing contact plate plunger and turned firing contact plate counterclockwise until arrows on plate and breechblock were alined with each other. | ___ | ___ |
| . Removed firing contact plate, firing contact plate plunger, and spring. | ___ | ___ |
| . Removed plastic washer, firing contact, and firing contact sleeve. | ___ | ___ |
| . Removed retractor pivot pin and firing pin retractor from retractor guide. | ___ | ___ |
| . Removed screw, washers, and clamp securing the retractor driver to the bottom of the breechblock. (Use Allen wrench to remove screws.) | ___ | ___ |
| . Removed retractor driver, retractor driver shaft, and spring. | ___ | ___ |

Elapsed Time: _____ minutes.

9. ASSEMBLE MAIN GUN BREECHBLOCK (10 MINUTES).

- | | | |
|--|-----|-----|
| a. Assembly: | | |
| . Installed retractor driver spring, shaft, and retractor driver into the bottom of the breechblock. | ___ | ___ |
| . Affixed the retractor group to the bottom of breechblock by installing securing clamp, washers, and screw with the Allen wrench. | ___ | ___ |
| . Inserted firing contact sleeve, firing contact, plastic washer, spring, and firing contact plate plunger into the breechblock. | ___ | ___ |
| . Installed firing pin retractor into retractor guide and secured it with the retractor pivot pin. | ___ | ___ |
| . Replaced firing contact plate by alining the arrow and depressing and rotating the plate clockwise until firing contact plate plunger engaged locking note in plate. | ___ | ___ |
| b. Installation: | | |
| . Installed right and left extractors into extractor pivots in the breech ring. | ___ | ___ |
| . Inserted chain hoist into eye bolt on breechblock. | ___ | ___ |
| . Raised breechblock and guided it into breech ring until breechblock came in contact with extractor plungers. | ___ | ___ |
| . Depressed plungers and moved breechblock upward. | ___ | ___ |
| . Installed breechblock crank pivots in breechblock crank. | ___ | ___ |
| . Inserted pivot in breechblock T-slot. | ___ | ___ |
| . Tripped extractors with the screwdriver and raised the breechblock to the closed position. | ___ | ___ |

	<u>Yes</u>	<u>No</u>
. Inserted small screwdriver or rod into the hole in breechblock crank stop and slid stop to the rear position.	—	—
. Jiggled the crank stop back and forth to assure that the plunger was seated in its recess.	—	—
. Released the tension on the chain hoist.	—	—
. Turned adjuster clockwise until plunger entered the first recess.	—	—
. Removed chain hoist and eye bolt.	—	—
. Installed retractor guide with firing pin retractor and firing pin in its well by pushing guide forward until it was flush with inner surface of the well.	—	—
. Installed firing pin spring and firing pin spring retainer.	—	—
. Depressed plunger, and twisted retainer clockwise until plunger was seated in its recess.	—	—
. Opened and closed breech several times to test for binding or shock.	—	—
. Adjusted tension on the closing spring to counteract any binding or shock in breech operation.	—	—

Elapsed Time: _____ minutes.

SCORING.

To pass, soldier must have:

- a. Checked operation of the M219 (without being told) after assembling it.
- b. Cleared the M219 within the time specified.
- c. Completed disassembly and assembly of the M219 and breechblock within the time specified.
- d. Been checked "Yes" on all performance measures.

PASS FAIL

TANK CREWMAN READINESS TEST

LOADER/GUNNER
STATION 3

NAME _____

SSAN _____

SCORER NAME _____

DATE _____

TANK CREWMAN READINESS TEST

LOADER/GUNNER

STATION 3

CONDITIONS. Fully operational M60A1 situated on level ground with coaxial machinegun mounted. Boresight panel is at appropriate range (1200 meters). Gun tube is aimed at boresight target, but slightly out of alinement with respect to target. Gunner's direct fire sights are dirty and instrument lights are inoperative.

INSTRUCTIONS TO LOADER/GUNNER. "This test will be conducted in two parts. During Part 1 you will perform some loader tasks; in Part 2 you will perform some gunner tasks. As the loader you will.

1. Prepare tank for boresighting.
2. Boresight M219 machinegun.
3. Check boresight alinement of main gun.
4. Perform main gun prepare-to-fire checks from Loader's station.

Perform each task when I instruct you to do so. You may use your TM. I will observe your performance and serve as the other crew members as needed. Do you have any questions? Work quickly, but carefully. Ready... begin."

PART ONE

Yes No

PERFORMANCE MEASURES.

1. PREPARE TANK FOR BORESIGHTING.

- . Placed back thread over witness lines on muzzle end of main gun and secured thread tautly.
- . Removed firing mechanism from breechblock.

___ ___
___ ___

2. BORESIGHT M219 MACHINEGUN MOUNTED ON TANK.

- . Removed the solenoid electrical lead from the machinegun backplate assembly by pulling the solenoid plug down.
- . Pulled the right disconnecter ring rearward to disengage the disconnecter pin from the disconnecter hole.
- . Rotated the receiver downward and pulled rearward until disengaged from mounting block.
- . Loosened support setscrews located in the gun mounted cover shield collar approximately 1 1/2 turns.
- . Selected the target employed to boresight the main gun.

___ ___
___ ___
___ ___
___ ___
___ ___

	<u>Yes</u>	<u>No</u>
. Alined the machinegun bore vertically on target while viewing the aiming point through the right binocular M17A1 so as to adjust the machinegun elevation alinement with the bore of the main gun by loosening or tightening the adjusting screws.	---	---
. Alined the machinegun bore horizontally while viewing the aiming point through the right binocular M17A1 so as to adjust the machinegun azimuth alinement with the bore of the main gun by loosening or tightening the front end and rear horizontal adjusting screws.	---	---
. Tightened all lock and jam nuts.	---	---
. Adjusted support setscrews in the gun mount cover shield collar until they contact the flash suppressor body then backed them off 1/4 to 1/2 turn.	---	---
3. CHECK BORESIGHT ALINEMENT OF MAIN GUN.		
On request from Gunner to confirm that muzzle cross threads are on aiming point:		
. Checked alinement of main gun by sighting through firing pin hole with M17A1 binocular to see if cross threads lay on aiming point.	---	---
. Reported gun out of alinement and assisted Gunner to aline it.	---	---
4. PERFORM MAIN GUN PREPARE-TO-FIRE CHECKS FROM LOADER'S STATION.		
On command "PREPARE TO FIRE":		
. Checked recoil oil by feeling replenisher indicator tape for one rough and one smooth edge.	---	---
. Opened breech and looked in chamber for obstruction.	---	---
. Tightened M219 machinegun mounting bolts.	---	---
. Plugged electrical lead into solenoid.	---	---
On command "CHECK FIRING SWITCHES":		
. Placed main gun safety switch in FIRE POSITION.	---	---
. Installed circuit tester between breechblock and face of chamber.	---	---

	<u>Yes</u>	<u>No</u>
. Observed for lighting of circuit tester bulb each time Gunner or TC announced "ON THE WAY", and announced "NO FIRE" any time bulb failed to light.	—	—
. Closed the cover on the coaxial machinegun, charged it, and listened for forward action of barrel and barrel extension when Gunner and TC activated firing switches (recharging coax before each check.)	—	—
. Removed and stowed circuit tester.	—	—
On command "REPORT":		
. Reported "LOADER READY."	—	—

SCORING.

To pass, soldier must have:

- a. Reported that main gun was not alined with boresight target and correctly assisted the Gunner to aline it.
- b. Alined M219 with boresight target.
- c. Been checked "Yes" on all performance measures.

PASS FAIL

PART TWO

INSTRUCTIONS TO LOADER/GUNNER. "In Part 2 of this test you will perform the following tasks from the Gunner's station:

5. Place turret into power operation.
6. Perform main gun prepare-to-fire checks from Gunner's station.
7. Prepare tank for boresighting.
8. Prepare azimuth indicator for operation.
9. Operate elevation quadrant (elevate main gun to +15).
10. Boresight Gunner's telescope.
11. Boresight daylight sight of Gunner's periscope during daylight.
12. Boresight IR sight of Gunner's periscope during daylight.
13. Boresight tank searchlight using alternate method.
14. Boresight M219 machinegun.

Perform each task when I instruct you to do so. You may use your TM. I will observe your performance and serve as the other crew members as needed. Do you have any questions? Work quickly, but carefully, Ready... begin."

PERFORMANCE MEASURES.

	<u>Yes</u>	<u>No</u>
5. PLACE TURRET INTO POWER OPERATION.		
. Performed zero pressure check to insure accumulator charge of 450-500 PSI.	___	___
. Checked hydraulic power pack oil level.	___	___
. Insured the tank and surrounding area are clear of obstruction.	___	___
. Insured crew is in safe position and Driver has lowered his seat and has his head down.	___	___
. Instructed Loader to release gun tube from travel lock.	___	___
. Unlocked turret lock.	___	___
. Announced POWER to alert the crew.	___	___
. Asked driver if engine was running and set at 800 to 900 RPM.	___	___
. Placed manual traversing handle locking lever in the detent position.	___	___
. Turned TURRET POWER switch ON.	___	___
. Squeezed magnetic brake switch and rotated Gunner's control handle to traverse turret.	___	___
. Rotated handles rearward and forward to elevate and depress gun.	___	___

6. PERFORM PREPARE-TO-FIRE CHECKS FROM GUNNER'S STATION. Yes No

On command PREPARE-TO-FIRE:

- . Cleaned interior direct fire sights. ___
- . Opened and closed ballistic shield. ___
- . Checked instrument lights and indicated they were inoperative. ___

On command CHECK FIRING SWITCHES:

- . Turned main gun switch ON. ___
- . Depressed firing trigger on power control handle and trigger on manual elevating control handle. ___
- . Rotated main gun manual firing device T-handle. ___

Note: Announced ON THE WAY each time a trigger is checked for the main gun or the manual firing device is actuated.

- . Turned main gun switch OFF. ___
- . Turned coaxial machinegun switch ON. ___
- . Depressed firing trigger on manual elevating control handle. ___
- . Turned coaxial machinegun switch OFF. ___

On command CHECK FIRING CONTROLS:

- . Set range correction knob of ballistic computer at zero. ___
- . Turned superelevation handcrank. ___
- . Pushed RESET button on computer. ___
- . Index various ranges into computer. ___
- . Turned range correction knob of ballistic computer to proper setting. ___
- . Reported GUNNER READY on command REPORT. ___

PREPARE TANK FOR BORESIGHTING.

After "LOADER" removed firing mechanism from breechblock:

- . Centered right telescope of binocular M17A1 over firing pinhole. ___
- . Aligned axis of 105mm gun bore on right angle of aiming point by operating the manual traversing and elevating handles according to the Loader's directions. ___

	<u>Yes</u>	<u>No</u>
8. PREPARE AZIMUTH INDICATOR FOR OPERATION.		
. Rotated rheostat knob until desired brightness is obtained.	—	—
. Placed the aiming cross of the periscope on the reference point.	—	—
. Performed accuracy tests by manually traversing turret 360 degrees to return to original reference point.	—	—
. Set the micrometer and azimuth points on zero.	—	—
. Performed slippage test by traversing the turret rapidly in power and stopping suddenly.	—	—
. Repeated this operation two or more times in same direction.	—	—
. Traversed turret manually in opposite direction to return to original reference point.	—	—
. Insured that both the micrometer and azimuth points are on zero.	—	—
9. OPERATE ELEVATION QUADRANT (ELEVATE MAIN GUN TO +15).		
. Placed aiming point on the center of the target and established a line of sight.	—	—
. Measured the position of the gun tube by rotating the micrometer knob until the bubble is centered in the level vial.	—	—
. Announced elevation by reading from the elevation and micrometer scales.	—	—
CONFIRM +15	—	—
10. BORESIGHT GUNNER's TELESCOPE		
. Set superelevation counter on the ballistic computer to zero.	—	—
. Moved reticle selector switch until reticle corresponding to type of ammunition that will be used to zero can be seen through the eyepiece.	—	—
. Unlocked telescope mount elevation and deflection boresight knobs.	—	—
. Rotated the boresight knobs until the boresight aiming point is in the same position as the muzzle cross threads.	—	—
. Moved elevation and deflection knob locking levers to the lock position.	—	—
. Rotated slip scales on the elevation and deflection knobs to read 3 and 3.	—	—
. Told Loader to confirm that the muzzle cross threads are on the aiming point.	—	—
CONFIRM	—	—

	<u>Yes</u>	<u>No</u>
11. BORESIGHT DAYLIGHT SIGHT OF GUNNER'S PERISCOPE.		
. Sighted through the eyepiece, disengaged the elevation and deflection boresight knobs, and rotated the knobs until the aiming cross is on the same aiming point as the muzzle cross threads.	—	—
. Rotated slip scale on the elevation and deflection boresight knobs to read 4 and 4.	—	—
. Placed daylight sight reticle on the aiming point.	—	—
. Told Loader to confirm that the muzzle cross threads are on the aiming point.	—	—
CONFIRM	—	—
12. BORESIGHT IR SIGHT OF GUNNER'S PERISCOPE DURING DAYLIGHT.		
. Opened the ballistic shield.	—	—
. Placed opaque material over the periscope head assembly with a 3/4 inch hole in line with the IR body.	—	—
. Placed the IR switch in the 1.5 volt position.	—	—
. Viewed through the IR eyepiece and rotated the IR diopter to the maximum plus reading then back until the grain on the converter tube surface as seen through the eyepiece appears clear and sharp.	—	—
. Rotated the light source control until the reticle illumination has the desired brightness.	—	—
. Sighted through the eyepiece and rotated focusing ring until the target appears with the maximum sharpness.	—	—
. Disengaged and rotated the elevation and deflection boresight knobs until the aiming cross of the reticle is aligned on the same aiming point as the muzzle cross threads.	—	—
. Rotated slip scale on the elevation and deflection boresight knobs to read 4 and 4.	—	—
. Placed aiming cross on the reticle of the daylight scope on the aiming point.	—	—
. Told Loader to confirm that the muzzle cross threads are on the aiming point.	—	—
CONFIRM	—	—

13. BORESIGHT TANK SEARCHLIGHT USING THE ALTERNATE METHOD.

Yes No

After "TC" laid the bottom of the searchlight beam above and just touching the reference mark:

- . Removed superelevation from fire control system using computer's handcrank.
- . Boresighted main gun of lower cross.
- . Centered the bubble on the elevation quadrant using the micrometer knob.
- . Applied plus 5 mils to elevation quadrant using the micrometer knob.
- . Manually elevated the gun until the bubble is centered.

CONFIRM

14. BORESIGHT AN M219 MACHINEGUN MOUNTED ON A TANK.

After "LOADER" tightened both horizontal adjustment screws:

- . Rotated, either to the left or right, the rheostat knob on the infinity sight M44C for periscope M31 or the rheostat knob of the light source control for periscope M32 in order to adjust brightness of reticle.
- . Rotated both the elevation and deflection boresight knobs on the infinity sight so as to aline the center reticle on aiming point of target.

CONFIRM

SCORING.

To pass:

- a. The soldier must have been checked "Yes" on each performance measure.
- b. The scorer must verify that optics and weapons are boresighted by confirming that reticle aiming crosses are on same aiming points as muzzle cross threads.
- c. The main gun must be elevated to +15.

PASS FAIL

TANK CREWMAN READINESS TEST

STATION 4

NAME _____

SSAN _____

SCORER NAME _____

DATE _____

TANK CREWMAN READINESS TEST

DRIVER
GUNNER/LOADER

STATION 4

INSTRUCTIONS TO THE SCORER. Five activities will be tested at this station. They are:

1. Target acquisition (written test).
2. Replenisher tape (hands-on test).
3. Caliber .45 pistol (hands-on test).
4. M3A1 submachinegun (hands-on test).
5. First Aid (hands-on test).

The CONDITIONS, INSTRUCTIONS, PERFORMANCE MEASURES, and SCORING for each activity is presented separately. You will first administer the written test for the target acquisition activity. Every soldier in the group can take this test at the same time. Then you will administer the hands-on tests to one soldier at a time. Make sure that the soldiers waiting to be tested on the hands-on activities cannot observe the performance of the soldier being tested.

STATION 4

ACTIVITY 1: Target Acquisition

CONDITIONS. Give each soldier an answer sheet, a test booklet, and a pencil. A chair and a writing surface must be available for each soldier. A stopwatch will be necessary to time the task.

INSTRUCTIONS TO SOLDIER. "During this activity you will take a written test on some target acquisition subjects. These include: 'Target Acquisition Scanning Techniques', 'Locating and Reporting Targets', and 'Target Range Estimation'. Write all your answers on the separate answer sheet. You will have 15 minutes to complete the test. If you have any questions during the test, raise your hand. Before we begin, write your name, your SSAN, and the date in the spaces on your answer sheet Are there any questions about what you are to do? You have 15 minutes . . . Begin."

PERFORMANCE MEASURES.

This written test covers three target acquisition subjects:

1. Target Acquisition Scanning Techniques (8 Questions, 15 Answers).
2. Locating and Reporting Targets (3 Questions, 14 Answers).
3. Target Range Estimation (5 Questions, 13 Answers).

SCORING.

A PASS/FAIL score will be given for each target acquisition subject. The PASS/FAIL cutoff for each is:

1. Target Acquisition Scanning Techniques (12 correct answers, 80%).
2. Locating and Reporting Targets (11 correct answers, 80%).
3. Target Range Estimation (9 correct answers, 70%).

STATION 4

ACTIVITY 2: Replenisher Tape

CONDITIONS. Replenisher tape mock-up positioned forward of the soldier in the same relative position as in the loader's station. The tape can be set in any one of four positions: (1) one rough edge and one smooth (2) two rough edges (3) two smooth edges, and (4) two long notches. Present each of the four settings twice in a series of eight settings in random order to soldier.

INSTRUCTIONS TO SOLDIER. "In this part of the test I am going to give you some different settings of the replenisher tape, and you are to feel the tape and tell me what action you would take if you got that reading (a) during firing, and (b) before firing (during mission preparation). I will set up the tape and say "Before firing" ("During firing"), "Ready," you should then reach up into the mock-up, feel the tape and immediately report what action is called for."

TASK.

Determine corrective action required by replenisher tape.

PERFORMANCE MEASURES.

Yes No

- . Reached up with left hand behind the rangefinder and to the left end of the replenisher cylinder and felt tape. ____
- . Took no action if felt one rough edge and one smooth edge. ____
- . Added oil to replenisher (after announcing "CEASE FIRE," if during firing) if felt rough edges on both sides of tape. ____
- . Continued to check tape frequently during firing if felt smooth edges on both sides of tape, but drained oil from replenisher at first opportunity. ____
- . Drained oil from replenisher (after announcing "CEASE FIRE," if during firing) if felt two long notches in tape. ____

SCORING.

To pass, soldier must have:

- a. Stated the correct action for each of the eight test trials for during-firing and before-firing conditions.
- b. Responded in each trial without hesitation, immediately after feeling the tape.

STATION 4

ACTIVITY 3: Caliber .45 Pistol

CONDITIONS. Caliber .45 pistol and magazine loaded with dummy caliber .45 ammunition is on a table in front of the soldier. The weapon is cleared. These conditions are necessary for the first performance measure. The conditions for the remaining performance measures follow from each preceding one. If the soldier performs a performance measure incorrectly, set up the test conditions for the next one.

INSTRUCTIONS TO SOLDIER. "You will perform five tasks during this activity. They are:

1. Load the caliber .45 pistol.
2. Clear the caliber .45 pistol.
3. Disassemble the caliber .45 pistol.
4. Assemble the caliber .45 pistol.
5. Perform immediate action on caliber .45

I will give you specific instructions for each task. Located in front of you is a loaded magazine and a cleared caliber .45 pistol. You must load the pistol. You will have five seconds. Do you have any questions concerning this requirement? Ready . . . begin."

PERFORMANCE MEASURES.

Yes No

1. LOAD THE CALIBER .45 PISTOL.

- . Inserted magazine.
- . Pulled slide to the rear then released.

___ ___
___ ___

Elapsed Time: _____ seconds

NOTE: Tell soldier to put pistol down. If soldier did not load pistol correctly, you must do so.

INSTRUCTIONS TO SOLDIER: "Your next requirement is to clear the weapon. You will have ten seconds. Do you have any questions concerning this requirement? Ready . . . begin."

2. CLEAR THE CALIBER .45 PISTOL.

Yes No

- . Kept weapon in RAISED PISTOL position.
- . Removed magazine.
- . Pulled slide to the rear and locked slide.
- . Looked and felt into chamber.
- . Allowed slide to go forward.
- . Pulled trigger.

Elapsed Time: _____ seconds

NOTE: Tell soldier to put pistol down. If soldier did not clear pistol correctly, you must do so.

INSTRUCTIONS TO SOLDIER: "You have one minute to field disassemble the weapon. Do you have any questions concerning this requirement? Ready . . . begin."

3. DISASSEMBLE THE CALIBER .45 PISTOL.

Yes No

- . Removed recoil spring plug.
- . Removed slide top.
- . Removed receiver group.
- . Removed recoil spring and recoil spring guide.
- . Removed barrel bushing.
- . Removed barrel and slide group.

Elapsed Time: _____ seconds

NOTE: If soldier did not disassemble pistol correctly, you must do so.

INSTRUCTIONS TO SOLDIER: "Now assemble the pistol and perform a function check. You will have two minutes. Do you have any questions concerning this requirement? Ready . . . begin."

4. ASSEMBLE THE CALIBER .45 PISTOL.

Yes No

- . Inserted barrel in slide group.
- . Inserted barrel bushing.
- . Replaced recoil spring and recoil spring guide.
- . Replaced receiver group.
- . Replaced slide stop.
- . Inserted magazine.
- . Performed a function check.

Elapsed Time: _____ seconds

NOTE: If soldier did not assemble pistol correctly, you must do so.

INSTRUCTIONS TO SOLDIER: "Pick up the weapon and point it down range as in firing. Assume the weapon failed to fire. Perform immediate action required when the slide is forward. Be sure you wait the required time for the hang fire. You will have 20 seconds. Do you have any questions concerning this requirement? Ready . . . begin."

- | 5. PERFORM IMMEDIATE ACTION ON CALIBER .45 PISTOL: | <u>Yes</u> | <u>No</u> |
|--|------------|-----------|
| . Recoocked hammer and attempted to fire. | _____ | _____ |
| . Waited ten seconds for hang fire. | _____ | _____ |
| . Pulled slide to the rear. | _____ | _____ |
| . Allowed slide to go forward. | _____ | _____ |
| . Attempted to fire. | _____ | _____ |

Elapsed Time: _____ seconds

SCORING.

To pass, soldier must have:

- a. Completed each task within the time specified.
- b. Been checked "Yes" on all performance measures.

STATION 4

ACTIVITY 4: M3A1 Submachinegun

CONDITIONS. M3A1 Submachinegun and magazine loaded with dummy caliber .45 ammunition is on a table in front of the soldier. The weapon is cleared. These conditions are necessary for the first performance measure. The conditions for the remaining performance measures follow from each preceding one. If the soldier performs a performance measure incorrectly, set up the test conditions for the next one.

INSTRUCTIONS TO SOLDIER. "You will perform five tasks during this activity. They are:

1. Load the M3A1 Submachinegun.
2. Clear the M3A1 Submachinegun.
3. Disassemble the M3A1 Submachinegun.
4. Assemble the M3A1 Submachinegun.
5. Perform immediate action on the M3A1 Submachinegun.

I will give you specific instructions for each task. Located in front of you is a loaded magazine and a cleared M3A1 Submachinegun. You must load the submachinegun. You will have five seconds. Do you have any questions concerning this requirement? Ready . . . begin."

PERFORMANCE MEASURES.

Yes No

1. LOAD THE M3A1 SUBMACHINEGUN.

- . Opened cover.
- . Pulled bolt to the rear.
- . Closed cover.
- . Inserted magazine.

Elapsed Time: _____ seconds

NOTE: Tell soldier to put submachinegun down. If soldier did not load submachinegun correctly, you must do so.

INSTRUCTIONS TO SOLDIER: "Your next requirement is to clear the submachinegun. You will have ten seconds. Do you have any questions concerning this requirement? Ready . . . begin."

2. CLEAR THE M3A1 SUBMACHINEGUN.

Yes No

- . Pressed magazine catch and removed magazine.
- . Opened cover.
- . Pulled bolt to rear, looked and felt into chamber.
- . Squeezed trigger and allowed bolt to go forward.
- . Closed cover.

Elapsed Time: _____ seconds

NOTE: Tell soldier to put submachinegun down. If soldier did not clear submachinegun correctly, you must do so.

INSTRUCTIONS TO SOLDIER: "You have one minute to field disassemble the submachinegun. Do you have any questions concerning this requirement? Ready . . . begin."

3. DISASSEMBLE THE M3A1 SUBMACHINEGUN.

Yes No

- . Removed stock.
- . Removed trigger guard.
- . Removed housing assembly.
- . Removed magazine catch assembly.
- . Removed barrel.
- . Removed bolt and guide group.
- . Removed sear pin.
- . Removed trigger pin.
- . Removed trigger and sear group.

Elapsed Time: _____ seconds

NOTE: If soldier did not disassemble submachinegun correctly, you must do so.

INSTRUCTIONS TO SOLDIER: "Now assemble the submachinegun and perform a function check. You will have two minutes. Do you have any questions concerning this requirement? Ready . . . begin."

4. ASSEMBLE THE M3A1 SUBMACHINEGUN.

Yes No

- . Connected trigger and sear group.
- . Inserted trigger pin.
- . Inserted sear pin.
- . Inserted bolt and guide group.
- . Inserted barrel.
- . Inserted magazine catch assembly.
- . Inserted housing assembly.
- . Inserted trigger guard.
- . Inserted stock.
- . Performed a function check.

Elapsed Time: _____ seconds

NOTE: If soldier did not assemble submachinegun correctly, you must do so.

INSTRUCTIONS TO SOLDIER: "Pick up the submachinegun and point it down range as in firing. Assume the weapon failed to fire. Perform immediate action required when the slide is forward. Be sure you wait the required time for the hang fire. You will have 20 seconds. Do you have any questions concerning this requirement? Ready . . . begin."

5. PERFORM IMMEDIATE ACTION ON M3A1 SUBMACHINEGUN.

Yes No

. Removed the magazine.

. Retracted the bolt.

. Looked and felt into chamber.

. Closed the cover, replaced the magazine, opened the cover and attempted to fire.

Elapsed Time: _____ seconds

SCORING.

To pass, soldier must have:

a. Completed each task within the time specified.

b. Been checked "Yes" on all performance measures.

STATION 4

ACTIVITY 5: First Aid

CONDITIONS. A first aid dummy and first aid kit will be provided.

INSTRUCTIONS TO SOLDIER: "You are a member of a tank crew and your company is conducting a main gun firing exercise. One of the other men in the crew was burned on the thigh when a hot shell casing was ejected from the main gun. Tell me and show me on the dummy what the proper first aid treatment is for this burn. You will have three minutes. Any questions? Ready . . . begin."

PERFORMANCE MEASURES.

Yes No

1. GIVE FIRST AID TO BURN VICTIM.

Soldier must say or do the following:

- . Cut and gently lift away clothing covering burn without touching burn.
- . Avoid removing clothing touching burn and avoid cleaning burn.
- . Avoid pulling clothing over burn area.
- . Avoid breaking blisters.
- . Avoid putting ointments or medications on burn.
- . Place and secure sterile dressing over burned area.
- . If casualty is conscious, prepare and give salt solution over 1-hour period.
- . Stop giving solution if casualty becomes nauseated.

Elapsed Time: _____ seconds

INSTRUCTIONS TO SOLDIER: "You are still a member of a tank crew and your company is conducting a main gun firing exercise. A member of your crew received a broken arm when a main gun shell case was ejected from the main gun. Tell me and show me on the dummy what the proper first aid treatment is for this injury. You will have three minutes to complete this requirement. Any questions? Ready . . . begin."

2. GIVE FIRST AID TO FRACTURE VICTIM.

Yes No

Soldier must say or do the following:

- . Avoid moving the casualty.
- . Use available material to pad splints.
- . Place a minimum of two tiers above the break and two tiers below the break.
- . Place a splint on each side of the break to immobilize fracture and adjacent joints.
- . Secure splints with tiers, ensuring that knots are on splints and not on casualty's limb.
- . Ensure that no tiers are directly over break.

Elapsed Time: _____ seconds

SCORING.

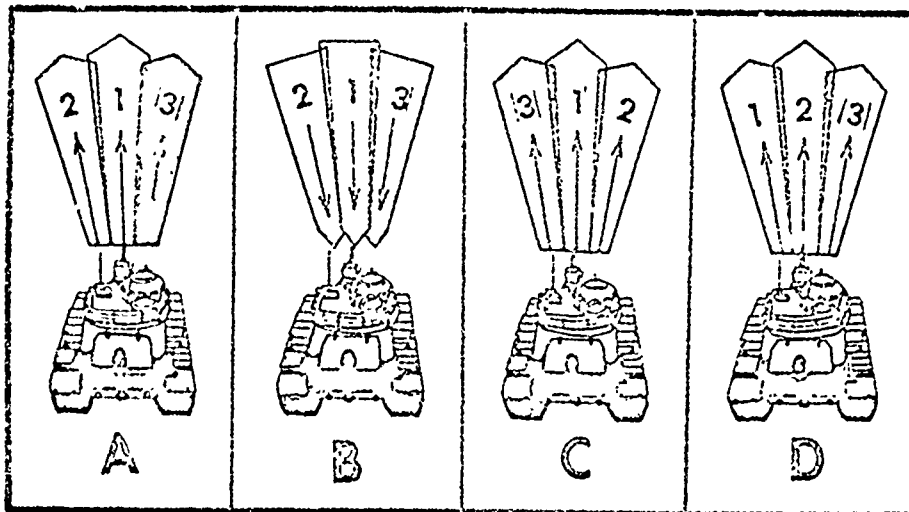
To pass, soldier must:

- a. Perform each task within the time specified.
- b. Have been checked "Yes" on each performance measure.

TARGET ACQUISITION SCANNING TECHNIQUES

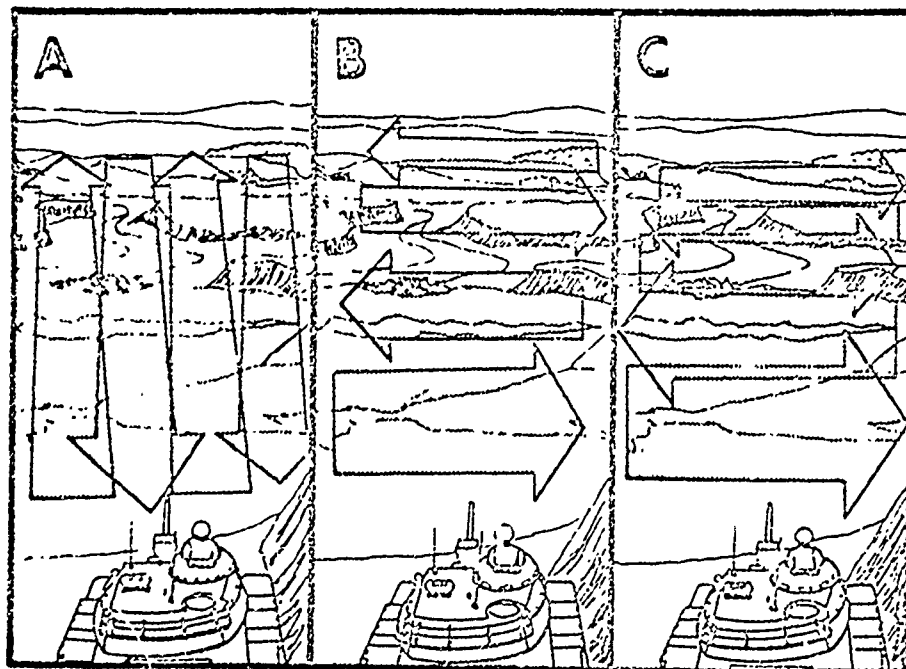
1. The pictures show four possible ways to do the first, quick search of an area of observation for targets. In the spaces below, check the letter of each picture that shows the first search being made correctly.

___ A.
___ B.
___ C.
___ D.



2. In this picture, the observer is doing his detailed search for targets. In the spaces below, check the letter of each picture that shows this detailed search being made correctly.

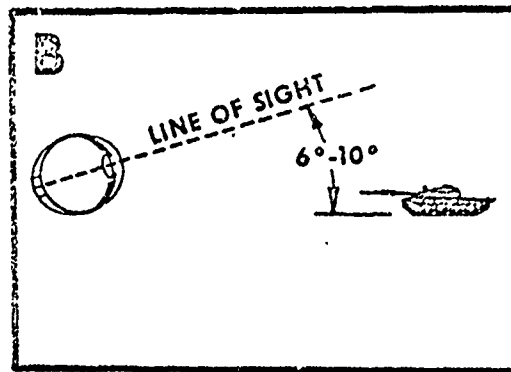
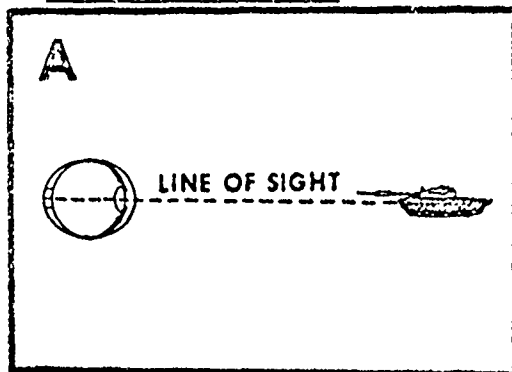
___ A.
___ B.
___ C.



PRE/POSTTEST (continued)

Administrative Instructions
TEC Lesson No. 020-171-1614-F

3. Check the procedures below that represent correct ways to adapt your eyes to the dark. (ONE ANSWER, OR MORE THAN ONE ANSWER MAY BE CORRECT.)
 - ☐ A. Close your eyes for 15 minutes before going into the dark.
 - ☐ B. Wear red goggles in lighted area for 20 minutes, followed by 10 minutes in the dark.
 - ☐ C. Spend 30 minutes in red-lighted area.
 - ☐ D. While in the dark, rapidly open and close your eyes.
4. In situations when you must continue observing your sector of responsibility, which procedure would you use to preserve your night vision? (ONE ANSWER, OR MORE THAN ONE ANSWER MAY BE CORRECT.)
 - ☐ A. When visible light occurs, like flashes from guns, close one eye and cover it until the light disappears.
 - ☐ B. Keep the white light on in your tank so that sudden unexpected illumination, like searchlight or gun flashes, will not affect your night vision.
 - ☐ C. When visible light occurs, like flashes from guns, close both eyes until the light disappears.
5. Which of these two visuals shows the correct way to observe a target at night.



6. Describe the correct method of scanning an area at night.
 - A. _____
 - B. _____
7. Check the person or persons listed below who can authorize the use of the tank searchlight for acquiring targets at night.
 - ☐ A. PLATOON SGT.
 - ☐ B. GUNNER
 - ☐ C. PLATOON LEADER
 - ☐ D. TANK COMMANDER
 - ☐ E. COMPANY COMMANDER

PRE/POSTTEST (continued)

Administrative Instructions
TEC Lesson No. 020-171-16 F

8. In the spaces below, list the devices that are on or in your tank that can be used to increase your efficiency in acquiring targets at night, without illumination, at greater ranges than would be possible with the unaided eye.

PRETEST

Administrative Instructions
TEC Lesson No. 020-171-1612-F

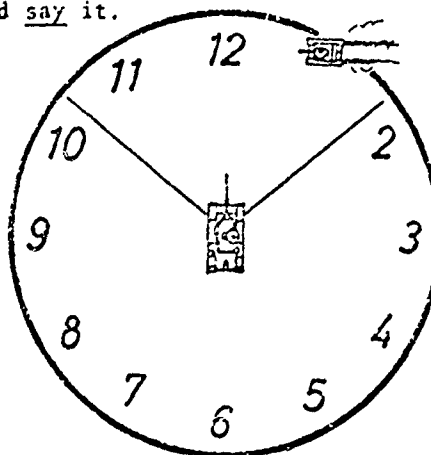
LOCATING AND REPORTING TARGETS

DO NOT WRITE ON THIS TEST.
USE A SEPARATE SHEET OF PAPER FOR YOUR ANSWERS.

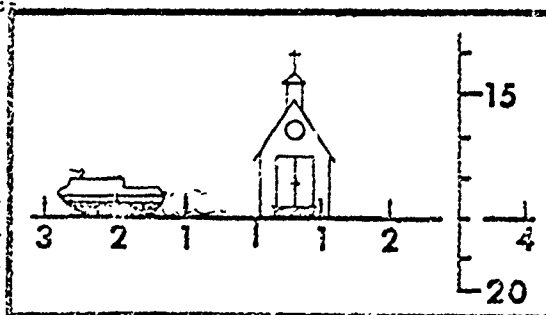
In the lesson, you learn two ways of alerting the rest of your crew when you acquire a target--(1) the clock method and (2) the reference-point method.

1. You are the driver and you acquire this target before your tank commander does. USING THE CLOCK METHOD, write the alert that you will give your tank crew. Write the alert the way you would say it.

The tank is at an estimated range of 1500 meters.

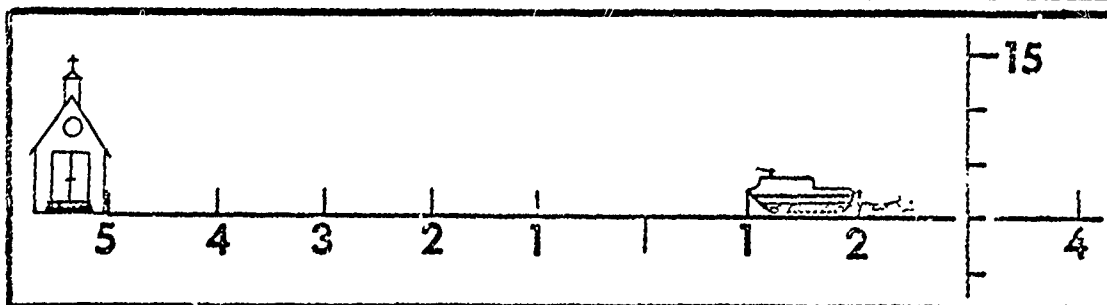


2. Here you have acquired a target with your binocular, USING THE REFERENCE POINT METHOD, write the alert you would give for this target. Write the alert the way you would say it. The P-C is at an estimated range of 1200 meters.



3. Using the REFERENCE-POINT METHOD again, write the alert you would give for this target. Write the alert the way you would say it.

The P-C is at an estimated range of 1800 meters.



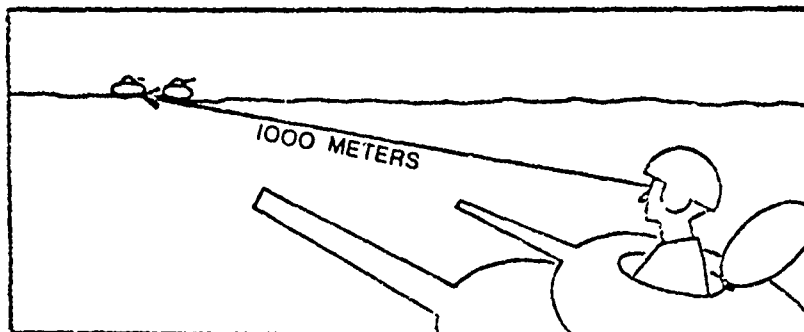
PRETEST

Administrative Instructions
TEC Lesson No. 020-171-1611-F

TARGET RANGE ESTIMATION

DO NOT WRITE ON THIS TEST
USE A SEPARATE SHEET OF PAPER FOR YOUR ANSWERS

1. Using the flash-to-bang method of estimating range, you see the flash, and four seconds later you hear the bang. The range to the target is approximately _____ meters. Write your answer on your separate answer sheet.
2. On your answer sheet, write an explanation or draw a diagram of how you would estimate the range to this target.



3. There are several factors that can cause a target to appear closer or farther away than it really is. Study the conditions in the test below and decide whether the targets under those conditions are more likely to appear closer or farther away than they really are. Write your answer by writing closer or farther, for each situation, on your answer sheet.

	WILL MAKE THE TARGET APPEAR	
	CLOSER	FARTHER
A. Target has regular outline, clear and sharp.		
B. Target blends with the background.		
C. Target is only partially visible.		
D. Target is viewed from low ground.		
E. Target is on smooth, regular terrain.		
F. Target is large in relation to its surroundings.		
G. Target is lighted from behind.		

4. If tank "A" is at 500 meters, and tank "B" appears half as big, what is the range to tank "B"? Write your answer on your answer sheet.
5. An enemy target, "C", is at 1200 meters. Target "D" seems to be twice as big as target "C". What is the range to target "D"? Write your answer on your answer sheet.

NAME _____

SSAN _____

DATE _____

ANSWER SHEET
TARGET ACQUISITION

I. Target Acquisition Scanning Techniques

1. _____ A

_____ B

_____ C

_____ D

2. _____ A

_____ B

_____ C

3. _____ A

_____ B

_____ C

_____ D

4. _____ A

_____ B

_____ C

5. _____ A

_____ B

6. A. _____

B. _____

7. _____ A

_____ B

_____ C

_____ D

_____ E

8. _____

II. Locating and Reporting Targets

1. _____

2. _____

3. _____

III. Target Range Estimation

1. _____

2.

3. A

B

C

D

E

F

G

4. _____ meters

5. _____ meters

APPENDIX B
SCORER GUIDELINES

SCORER GUIDELINES

During the next few months you will observe soldiers perform some tasks and decide if the soldiers perform the tasks correctly. To help you observe, we show you how to arrange the test station so that you can see everything a soldier does; to help you decide, we give you a scoresheet. Your job is to arrange the test station the same way for each soldier, look at what the soldier does, and decide if he did it as described on the scoresheet.

The first thing you must do as a scorer is read the scoresheet for the test station. The scoresheet will:

1. Describe the CONDITIONS which must be met each time the test is administered.
2. Provide the INSTRUCTIONS which are to be read to each soldier.
3. List the PERFORMANCE MEASURES which are to be performed at the test station.
4. Describe the SCORING procedure to determine whether the soldier passed the test.

Make sure you understand what is on the scoresheet and can perform all the task elements for each task. You will be given an opportunity to practice:

1. Performing the tasks;
2. Observing the tasks being performed; and
3. Deciding whether the tasks were performed correctly

before you administer the test. Use the practice time to find the best position for observing task performance. You will have to change position on some tasks to observe all the task elements.

The following guidelines must be strictly adhered to each time you administer the performance tests at your test station:

1. Arrange the equipment for your test station so you can see everything the soldier does.
2. Make sure that all equipment and materials required for each soldier at your test station

is made available and in good working condition. Nothing else should be provided for the soldier.

3. Do not administer the test at your station unless all materials and equipment are on hand and operational.
 - . You must arrange the equipment at your test station the same for each soldier. This is important when you administer performance tests. It is not fair if one soldier has his tools laid out on the turret floor and another has the tools he needs behind the gun roll. Make a sketch of the equipment arrangement and refer to it each time you set up your test station.
4. Do not administer the test at your station unless all test conditions as specified are met. All soldiers must encounter the same conditions and have the opportunity to achieve the same standards.
 - . The test conditions must be the same for each soldier. This is important when you administer performance tests. For example, there is a test on adjusting track tension. One soldier cannot encounter track tension too tight and another soldier encounter track tension too loose. Track tension must be the same for each soldier.
5. Read the instructions to the soldier exactly as they are printed. If he does not understand, repeat the instructions word for word. If he still does not understand, tell him: "Do the best you can. I am not permitted to help you in any way."
6. Stop the test if a soldier calls the equipment out of action for a suspected malfunction (this does not apply for the "immediate action" or "misfire" portions of the test). If a malfunction exists, have the malfunction corrected before re-starting the test. Restart the soldier at the step where the malfunction occurred. If no malfunction is found, give the soldier a NO for the step and have him continue the test.
7. Do not influence a soldier's performance by verbal comments, gestures, facial expressions, or the like. Each soldier must be treated in exactly the same manner.

8. Pay attention to what each soldier does at all times. Do not wait until the end of the task to fill in the scoresheet for that task. Make the checks on the scoresheet as the soldier performs the task.

. You must score the soldier on what you see him do--not on what you think he does.

. If the soldier gets to a point and stops because he does not know what to do next, do not coach him. If he does not resume after two minutes, show him how to do the next step, give him a NO for the step, and have him continue the test.

9. Do not give the soldier any feedback on the test--either that he did it right or wrong. If asked, say: "The information will have to be evaluated before your score is determined."

10. Interfere with the test if you see a soldier about to do something that could injure him or damage equipment. Tell him to STOP, warn him of the danger and let him continue the test. Score the item a NO.

11. The soldier can use the TM. When he does, write USED TM next to the task, time the task performance with your stopwatch, and write the time next to the task.

All your actions as a scorer should be guided by two principles:

1. Be sure the test conditions are the same for every soldier.
2. Be sure the standard is applied evenly to every soldier.

If you administer the tests in the manner described above, you will not have any difficulty.

APPENDIX C
TFM-BAT QUESTIONNAIRE

FORM A
INDIVIDUAL

TFM-BAT QUESTIONNAIRE

NAME _____ SSAN _____

UNIT _____

1. While you were in training at Ft Knox what type of training did you receive?

- a. Driver
- b. Gunner/loader

2. When you arrived at your current duty station how confident were you that you could perform the job you had been trained for?

- a. Very confident
- b. Fairly confident
- c. Moderately confident
- d. Not confident
- e. Very uncertain

3. What duty position do you have in the company at the present time?

- a. Driver
- b. Loader
- c. Gunner
- On tank number _____
- d. Not assigned to a tank

4. How many months have you had this position?

Between: 0-1 1-2 2-3 3-4 4-5 5-6 6-7 More than 7

5. How many hours training for this position have you received since you arrived in the unit?

Between: 0-5 5-10 10-15 15-20 20-25 25-30 30-35 More than 35

6. How many hours training, of any kind (not counting training in question 5) have you received since you arrived in the unit?

Between: 0-10 10-20 20-30 30-40 40-50 50-60 60-70 70-80
More than 80

7. How confident do you feel right now that you would be able to perform your job adequately in combat tomorrow morning?

- a. Very confident
- b. Fairly confident
- c. Moderately confident
- d. Not confident
- e. Very uncertain

8. Given your background training and the training program you have seen in your unit how confident are you that you will be able to adequately perform in combat six months from now?

- a. Very confident
- b. Fairly confident
- c. Moderately confident
- d. Not confident
- e. Very uncertain

APPENDIX D
DATA ANALYSES

Table D.1

Correlations Between the Percent of Tasks Passed
and the Average Percent of Performance Measures Passed

TYPE TEST	TEST PERIOD	<u>N</u>	<u>r</u>
Driver	Pre-test	29	.942
	Post-test	29	.850
Gunner/Loader	Pre-test	60	.856
	Post-test	60	.886
All	Pre-test	89	.899
	Post-test	89	.873

Table D.2

ANOVA of Percent of Tasks Passed By Trained Drivers As A
Function of Job Assignment (A), Type of Task (B), and Test Period (C)

SOURCE	SS	df	MS	F
Between Subjects		28		
A (Job)	26.83	1	26.83	
Ss W/Grps.	11,886.67	27	440.25	
Within Subjects		87		
B (Task)	33,837.58	1	33,837.58	260.13**
AB (Job x Task)	.96	1	.96	<1
B x Ss W/Grps.	3,512.16	27	130.08	
C (Test)	17.32	1	17.32	<1
AC (Job x Test)	3.73	1	3.73	<1
C x Ss W/Grps.	10,220.72	27	377.80	
BC (Task x Test)	1,595.68	1	1,595.68	7.35*
ABC (Job x Task x Test)	1.55	1	1.55	<1
BC x Ss W/Grps.	5,861.94	27	217.11	

* $p < .05$

** $p < .01$

Table D.3

ANOVA of Percent of Tasks Passed by Trained
Gunner/Loaders as a Function of Job Assignment (A), Retention
Interval (B), Type of Task (C), and Test Period (D)

SOURCE	SS	df	MS	F
Between Subjects				
A (Job)	93.70	1	93.70	<1
B (Interval)	90.28	3	30.09	<1
AB (Job x Interval)	1,502.87	3	500.96	<1
Ss W/Grps.	28,008.79	52	538.63	
Within Subjects				
C (Task)	189,296.26	2	94,648.13	544.80**
AC (Job x Task)	80.05	2	40.03	<1
BC (Interval x Task)	1,619.56	6	269.93	1.55
ABC (Job x Interval x Task)	906.72	6	151.12	<1
C x Ss W/Grps.	18,067.71	104	173.73	
D (Test)	163.72	1	163.72	<1
AD (Job x Test)	60.81	1	60.81	<1
BD (Interval x Test)	1,887.49	3	629.16	2.98
ABD (Job x Interval x Test)	298.65	3	99.55	<1
D x Ss W/Grps.	10,964.73	52	210.86	
CD (Task x Test)	1,554.86	2	777.43	5.29*
ACD (Job x Task x Test)	296.19	2	148.09	1.01
BCD (Interval x Task x Test)	1,682.00	6	280.33	1.91
ABCD (Job x Interval x Task x Test)	926.38	6	154.40	1.05
CD x Ss W/Grps.	15,280.17	104	146.92	

* $p < .05$ ** $p < .01$

Table D.4

ANOVA of Percent of Tasks Passed by Correctly Assigned
Drivers as a Function of Retention Interval (A), Type
of Task (B), and Test Period (C)

SOURCE	SS	df	MS	F
Between Subjects				
A (Interval)	1,330.59	2	665.30	1.733
Ss W/Grps.	6,910.78	18	383.93	
Within Subjects				
B (Task)	27,931.21	1	27,931.21	265.34**
AB (Interval x Task)	285.56	2	142.78	1.36
B x Ss W/Grps.	1,894.83	18	105.27	
C (Test)	74.03	1	74.03	<1
AC (Interval x Test)	800.96	2	400.48	<1
C x Ss W/Grps.	7,283.69	18	404.65	
BC (Task x Test)	1,151.54	1	1,151.54	6.53*
ABC (Interval x Task x Test)	64.89	2	32.44	<1
BC x Ss W/Grps.	3,174.99	18	176.39	

* $p < .05$

** $p < .01$

Table D.5

ANOVA of Percent of Tasks Passed by Correctly Assigned
Gunner/Loaders as a Function of Retention Interval (A),
Type of Task (B), and Test Period (C)

SOURCE	SS	df	MS	F
Between Subjects				
A (Interval)	841.23	3	280.41	<1
Ss W/Grps.	12,209.80	23	530.86	
Within Subjects				
B (Task)	79,196.09	2	39,598.04	235.60**
AB (Interval x Task)	1,129.58	6	188.26	1.12
B x Ss W/Grps.	7,731.26	46	168.07	
C (Test)	185.06	1	185.06	<1
AC (Interval x Test)	1,291.83	3	430.61	1.66
C x Ss W/Grps.	5,947.86	23	258.60	
BC (Task x Test)	1,332.53	2	666.27	3.92*
ABC (Interval x Task x Test)	1,785.78	6	297.63	1.75
BC x Ss W/Grps.	7,809.24	46		

* $p < .05$

** $p < .01$

Table D.6
Correlation of Percent of Tasks Passed for
Initial Versus Follow-Up Tests

TYPE OF TEST	<u>N</u>	TYPE OF TASK	<u>r</u> ¹
Driver	29	Driver Tasks	-.132
		Common Tasks	.293
		All Tasks	.116
Gunner/Loader	60	Loader Tasks	.208
		Gunner Tasks	.241*
		Common Tasks	.307*
		All Tasks	.315*

¹ r .95 (df = 27) = .312

r .95 (df = 58) = .214

APPENDIX E

PERCENT OF CREWMEN PASSING EACH TASK ELEMENT

TABLE E.1

PERCENT OF TRAINED DRIVERS PASSING EACH ELEMENT OF THE
DRIVER TASKS IN THE INITIAL (PRE) AND FOLLOW-UP (POST) TESTS

TASK AND TASK ELEMENTS	<u>N</u> ¹		% Pass ²	
	PRE	POST	PRE	POST
PERFORM BEFORE-OPERATION MAINTENANCE CHECKS AND SERVICES ON THE M27 PERISCOPE	28	28	<u>57</u>	<u>82</u>
. Inspected M27 periscope and spare for cracks and dirty lenses			57	82
. Cleaned dirty lenses			64	93
REMOVE THE M27 PERISCOPE			<u>57</u>	<u>97</u>
. Loosened wing nuts on both sides of the periscope			57	96
. Rotated retainers until clear of the peri- scope mounting lugs			57	96
. Removed periscope from the bracket			57	96
PERFORM BEFORE-OPERATION MAINTENANCE CHECKS AND SERVICES ON THE M24 (IR) PERISCOPE	28	28	<u>7</u>	<u>85</u>
. Pulled periscope holder lid handle down			11	89
. Opened lid			11	89
. Unlatched both catches on IR periscope stowage box			11	89
. Removed the periscope from stowage box			7	89
. Inspected the M24 (IR) periscope and spare head for cracked or dirty lenses and completeness			11	85
. Cleaned dirty lenses			14	85
INSTALL THE M24 (IR) PERISCOPE	28	28	<u>31</u>	<u>33</u>
. Closed the Driver's hatch			57	70
. Placed the Master Battery switch in the OFF position			46	50
. Instructed crew member to rotate the turret so the gun tube is forward			50	58

¹N = Number of soldiers who attempted the task.

²Percent of soldiers passing the overall task (i.e., passing every element in the task) is underlined.

TABLE E.1--Continued

TASK AND TASK ELEMENTS	<u>N</u>		<u>% Pass</u>	
	PRE	POST	PRE	POST
. Pulled up (rearward) on the elevation adjustment lever to insure bind (tension) has been released on elevation clamp pivots			54	61
. Loosened the jam nut on the front (forward) inside of the elevation clamp.			54	58
. Positioned the periscope in the periscope holder			54	58
. Pushed up on periscope until it locked in the holder. (Insured the periscope was locked in the holder before released). . .			54	58
. Insured the elevation clamp is positioned in the periscope holder detent			50	58
. Tightened the adjustment screw on the front right hand inside of the elevation clamp until the elevation clamp was firmly seated in the periscope holder detent			54	58
. Tightened the elevation clamp adjustment screw jam nut.			50	58
. Pushed elevation adjustment lever downward (forward) and locked periscope			50	52
. Unscrewed dust cap from power receptacle (center) location.			50	54
. Unscrewed power cable connecting plug from stowage receptacle on right-hand side of compartment.			46	58
. Threaded power cable connecting plug into periscope receptacle and hand tightened. .			46	58
. CONFIRM: Soldier did not expose periscope to direct sunlight			46	46
PLACE THE M24 (IR) PERISCOPE INTO OPERATION , ,	28	27	<u>21</u>	<u>15</u>
. Turned the Master Battery switch ON			43	74
. Placed the Blackout Selector switch in BO DRIVE			39	58
. Turned the IR switch ON			48	59
. Turned the Lighting Control switch handle to the left			37	52
. Pulled the elevation adjustment lever up. . .			33	46
. Adjusted periscope elevation angle to a comfortable position			33	56

TABLE E.1--Continued

TASK AND TASK ELEMENTS	<u>N</u>		<u>% Pass</u>	
	PRE	POST	PRE	POST
. Pushed elevation adjustment lever down to lock the periscope in position . . .			37	52
. Loosened the two inner wingnuts on the headrest until the proper eye distance is obtained, then retightened (hand-tight) both wingnuts.			33	44
. Bent headrest to fit head contour by pulling, pushing, or twisting on each side of the headrest.			30	37
. Allowed periscope to warm up for 5 minutes before adjusting focus.			22	37
. Unscrewed left and right dust caps from bottom focus controls			26	48
. Rotated left and right focus control knobs until the view through each eyepiece appeared with maximum sharpness			30	44
. Screwed left and right dust covers back over focus control knobs and tightened finger tight			30	48
PERFORM BEFORE-OPERATIONS CHECKS AND SERVICES ON THE GAS PARTICULATE UNIT	28	28	<u>3</u>	<u>25</u>
. Inspected precleaner, particulate filter unit, housing, gas filter cannisters and air heater for dents, missing or loose control knob, pinched or blocked air hose			21	44
. Wiped precleaner, particulate filter unit housing, gas filter cannisters and air-heater clean with a damp rag.			21	37
. Tightened hose assemblies and electrical cables.			21	48
. Removed spring clip from air inlet openings			29	52
. Turned Gas Particulate switch ON			86	74
. Disconnected air duct hose from Driver's orifice connector and checked air flow.			86	74
. Rotated air heater knob to ON and checked for indicator lamp operation.			82	74
. Checked air flow through the hose.			79	70

TABLE E.1--Continued

TASK AND TASK ELEMENTS	<u>N</u>		% Pass	
	PRE	POST	PRE	POST
. Allowed air to warm up at least five minutes			68	56
. Checked air temperature.			75	67
. Adjusted protective mask and attached air hose.			71	63
. Requested other crew members to check gas particulate operation			64	59
. Removed and stowed air hose and protective mask.			64	67
. Rotated air heater knob to OFF			57	67
. Turned Gas Particulate switch OFF.			61	70
. Replaced spring clip to air inlet openings			39	67
PERFORM PREPARE-TO-FIRE CHECKS FROM DRIVER'S STATION	28	28	<u>90</u>	<u>61</u>
. Started engine on TC's command, "CHECK FIRING SWITCHES".			96	63
. Reported "DRIVER READY" on TC's command, "REPORT".			93	85
CHECK TRACK TENSION.	28	28	<u>68</u>	<u>66</u>
. Moved vehicle forward on level hard surface, and when signaled by Loader, coasted to a stop without applying brakes.			71	68
. Make final forward adjustments (without applying brakes) in response to Loader signals			68	68
KNOW TARGET ACQUISITION TECHNIQUES	0	28	<u>-¹</u>	<u>0</u>
. Knew target acquisition scanning techniques.			-	0
. Knew procedures for locating and reporting			-	11
. Knew target range estimation procedures. .			-	25

¹Not tested.

TABLE E.1--Continued

TASK AND TASK ELEMENTS	<u>N</u>		<u>% Pass</u>	
	PRE	POST	PRE	POST
READ REPLENISHER TAPE	28	28	<u>68</u>	<u>55</u>
. Reached up with left hand behind the rangefinder and to the left end of the replenisher cylinder and felt tape			93	86
. Took no action if felt one rough edge and one smooth edge.			79	93
. Added oil to replenisher (after announcing "CEASE FIRE," if during firing) if felt rough edges on both sides of tape .			75	93
. Continued to check tape frequently during firing if felt smooth edges on both sides of tape, but drained oil from replenisher at first opportunity			68	79
. Drained oil from replenisher (after announcing "CEASE FIRE," if during firing) if felt two long notches in tape			75	64

TABLE E.2

PERCENT OF TRAINED GUNNER/LOADERS PASSING EACH ELEMENT
OF THE LOADER TASKS IN THE INITIAL (PRE) AND FOLLOW-UP (POST) TESTS

TASK AND TASK ELEMENTS	N ¹		% Pass ²	
	PRE	POST	PRE	POST
PERFORM BEFORE-OPERATIONS CHECKS AND SERVICES				
ON TANK ENGINE AND TRANSMISSION OIL LEVELS. . .	60	60	<u>38</u>	<u>41</u>
. Checked engine oil level.			83	63
. Responded correctly when asked if engine oil level was acceptable.			43	56
. Checked transmission oil level.			87	63
. Responded correctly when asked if transmission oil level was acceptable.			47	58
. Told Driver to start engine and idle at 700-750 RPM			83	86
. Waited until engine was warm.			87	88
. Checked engine oil level.			93	90
. Responded correctly when asked if engine oil level was acceptable.			93	83
. Checked transmission oil level.			93	90
. Responded correctly when asked if trans- mission oil level was acceptable.			93	81
CHECK TRACK TENSION	60	60	<u>17</u>	<u>19</u>
. Directed Driver to coast to a stop so that a track link was centered on the #2 and #3 support roller.			57	41
. Coordinated with Driver by arm and hand signals so that tank coasted to a stop with track link in proper position.			53	42
. Raised the track with a crowbar at the number two support roller and placed a block (1" thick by 6" square) between the number two support roller and the track link.			63	46
. Place a string or straight edge on the #2 and #3 support rollers.			45	37
. Measured the clearance between the bottom of the track and the top of string or straight edge midway between support rollers: Acceptable clearance is 1/4 to 5/16 inch (midway between Nos. 2 and 3 support rollers).			32	26

¹ N = Number of soldiers who attempted the task.

² Percent of soldiers passing the overall task (i.e., passing every element in the task) is underlined.

TABLE E.2--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
ADJUST TRACK TENSION.	60	60	<u>42</u>	<u>39</u>
. Removed the track and adjusting link screw and washer from the top of the track adjusting link.			72	83
. Used the track adjusting wrench on the track adjusting link and pulled up to increase track tension (right side) or pushed down to decrease track tension (right side). (Reversed directions for the left side.) [Track adjusting link must not extend beyond the red painted groove.]			73	61
. Adjusted track tension to 1/4-5/16 inch in tolerance.			47	52
. Installed lockwasher and lock screw and tightened with wrench until fully seated on the shoulder			70	71
CHECK OPERATION OF M3 HEATER (GAS PARTICULATE UNIT)	60	60	<u>20</u>	<u>22</u>
On Driver's request, "CHECK GAS PARTICULATE UNIT":				
. Rotated air heater knob to ON			83	82
. Checked air flow through hose			77	72
. Allowed air to warm up for at least five minutes			60	38
. Adjusted protective mask and attached air hose.			82	65
. Removed and stowed air hose and protective mask.			82	65
. Rotated air heater switch to OFF.			62	70
. Reported status of M3 Heater to the driver. .			38	47
STOW MAIN GUN ROUNDS IN THE TANK.	60	60	<u>60</u>	<u>40</u>
. Determined, by reference to Ammunition Stowage Plan and present load, how many of each type of round is needed			92	57
. Called out to assisting crewman how many of a given type of round is wanted.			68	85
. Insisted that round be handed in through turret nose down.			85	78

TABLE E.2--Continued

TASK AND TASK ELEMENTS	<u>N</u>		% Pass	
	PRE	POST	PRE	POST
. Stowed round in:				
- Ready rack by placing primer end down, swinging hinge of holder up and to the left, pulling out spring loaded knob on rod of holder, sliding hinge slot over rod behind knob, and releasing the knob.			92	92
- Tubular stowage rack by pushing round in nose first, swinging handle lock over primer end of round, and rotating handle lock securely in place.			92	93
- Turret bustle by seating round with nose toward inside of turret, swinging hinge up and to the left, pulling up clamp and slotting hinge in place below clamp, and pulling clamp down.			90	95
. Completed stowage of rounds one type at a time.			87	88
LOADS MAIN GUN IN RESPONSE TO FIRE COMMANDS				
BATTLESIGHT, SABOT LOADED	60	60	<u>46</u>	<u>45</u>
. Stood clear of path of recoil			97	97
. Placed firing safety switch in FIRE			93	83
. Announced "UP".			98	97
. Prepared to load a second round in case no "CEASE FIRE" is given			46	49
MAIN GUN NOT LOADED	60	60	<u>32</u>	<u>30</u>
. Placed firing safety switch in SAFE position.			93	97
. [Check replenisher tape].			60	68
. Opened breech			95	95
. Selected announced ammunition			95	97
. Unlocked ammunition ready rack.			93	97
. [Set range on APERS ammunition fuze when "BEEHIVE TIME" is announced in fire command].			56	- 1
. Inserted appropriate round into chamber by placing the round 2/3rds into chamber and pushing it the rest of the way with the heel of the fist, swinging arm up and away from closing breech.			97	97

¹ Step not performed.

TABLE E.2--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
. Stood clear of path of recoil.			97	92
. Placed firing safety switch in FIRE position			92	97
. Announced "UP"			97	93
. Prepared to load a second round in case no "CEASE FIRE" is given.			55	32
SABOT LOADED, DIFFERENT AMMUNITION ELEMENT GIVEN.	60	60	<u>32</u>	<u>30</u>
. Placed firing safety switch in SAFE position			88	88
. [Checked replenisher tape]			52	63
. Unload SABOT round			92	72
. Placed and locked SABOT round in ready rack			93	77
. Selected announced ammunition.			93	92
. Unlocked ammunition ready rack			93	93
. [Set range on APERS ammunition fuze when "BEEHIVE TIME" is announced in fire command]			87	-
. Inserted appropriate round into chamber by placing round 2/3rds into chamber, and pushing it the rest of the way with the heel of the fist, swinging arm up and away from closing breech			95	95
. Stood clear of path of recoil.			95	93
. Placed firing safety switch in FIRE position			90	97
. Announced "UP"			95	97
. Prepared to load a second round in case no "CEASE FIRE" is given.			52	44
READY COAX IN RESPONSE TO FIRE COMMANDS.	60	35	<u>97</u>	<u>94</u>
. Placed coax safety in FIRE position.			98	97
. Announced "UP"			97	94
ROTATED ROUND IN MAIN GUN MISFIRE PROCEDURE.	60	60	<u>85</u>	<u>72</u>
On Gunner's command "ROTATE ROUND":				
. Placed firing safety switch in SAFE position			85	92

TABLE E.2--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
. Opened breech slowly enough to extract round about 1/2 way.			98	95
. Rotated round 1/2 turn			97	85
. Pushed round into chamber with heel of the fist, swinging arm up and away from closing breech			98	93
. Stood clear of path of recoil.			98	90
. Placed firing safety switch in FIRE position			95	97
. Announced "UP"			97	93
UNLOAD MISFIRED MAIN GUN ROUND	60	60	<u>32</u>	<u>17</u>
. Told Gunner to turn main gun turret power switches OFF			32	30
. Placed firing safety switch in SAFE position			95	90
. Opened breech.			97	93
. Held breech operating handle down while TC (Gunner) pried round out of chamber. . . .			98	42
. Returned breech operating handle to latched position			97	73
APPLY IMMEDIATE ACTION TO REDUCE STOPPAGE OF AN M219 MACHINEGUN	60	34	<u>35</u>	<u>8</u>
On Command "STOPPAGE":				
. Waited 5 seconds to allow for a hangfire . .			73	32
. Charged the machinegun, locking the recoiling parts to the rear.			98	88
. Checked to see if the ammunition is feeding into the weapon.			45	91
. Announced "UP"			100	94
On Command "STOPPAGE":				
. Pulled barrel extension to the rear.			100	65
. Placed safety in SAFE.			98	85
. Raised cover and removed the ammunition. . .			97	91
. Removed "misfired" round from chamber. . .			88	88
. Placed safety in FIRE and hand functioned the weapon one cycle			90	35
. Reloaded the weapon.			97	85
. Announced "UP"			100	88

TABLE E.2--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
CLEAR AN M219 MACHINEGUN	60	36	<u>93</u>	<u>69</u>
. Place safety in FIRE position.			100	97
. Charged weapon to lock moving parts to the rear			100	92
. Directed gunner to place machinegun switch in the OFF position.			97	75
. Placed safety in the SAFE position			98	94
. Open cover assembly.			100	94
. Removed ammunition belt from the machine- gun.			100	94
. Raised feed tray			100	94
. Looked for ammunition.			100	94
. Place safety in FIRE position.			100	92
. Move bolt forward.			95	86
. Place safety in SAFE position.			100	94
. Close feed tray and cover.			100	94
REMOVE M219 MACHINEGUN FROM TANK	60	36	<u>85</u>	<u>97</u>
. Disconnected electrical lead from solenoid			95	97
. Loosened three support set screws in collar on gun mount cover shield.			91	100
. Removed machinegun retainer.			97	100
. Removed the machinegun			97	100
. Removed the spent cartridge bag.			88	100
. Removed the case ejection shield			86	100
DISASSEMBLE M219 MACHINEGUN.	60	36	<u>93</u>	<u>94</u>
. Removed barrel and jacket assembly from receiver			93	100
. Separated barrel from jacket assembly.			93	100
. Removed cover assembly			100	100
. Removed feed tray.			100	100
. Removed guide rod springs while holding barrel extension forward			100	97
. Separated guide rods from guide rod springs.			100	100
. Removed backplate assembly			100	100
. Retracted barrel assembly.			100	100
. Depressed buffer support lever and removed barrel extension			100	97

TABLE E.2--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
. Removed breechblock from barrel extension assembly.			100	100
. Removed retainer clip and charger assembly from projecting stud			100	100
ASSEMBLE M219 MACHINEGUN	60	36	95	91
. Installed charger assembly			100	94
. Placed breechblock assembly in barrel extension.			100	100
. Installed barrel extension			100	97
. Installed backplate assembly			100	100
. Joined guide rods and guide rod springs. . .			100	100
. Installed feed tray.			100	100
. Installed cover assembly			100	100
. Joined barrel to the jacket assembly . . .			95	100
. Joined barrel and jacket assembly with the receiver			97	100
CHECK OPERATION OF M219 MACHINEGUN	60	33	100	100
. Placed safety in FIRE position			100	100
. Charged weapon to lock moving parts to the rear			100	100
. Allowed barrel extension to ease forward by keeping tension on the charging handle and depressing the manual firing trigger			100	100
MOUNT M219 MACHINEGUN IN TANK.	60	35	90	80
. Backed-off the three support set screws on the gun mount cover shield flush with the collar of the gun port.			97	100
. Had the gunner depress the gun tube so that it was horizontal or slightly below.			95	100
. Placed the shell ejection shield on the shield support and fastened the six snap fasteners which hold it in place			95	100
. Installed the spent cartridge bag on the empty cartridge bag support by fastening the eight snap fasteners which hold it in place			97	100

TABLE E.2--Continued

TASK AND TASK ELEMENTS	<u>N</u>		% Pass	
	PRE	POST	PRE	POST
. Slid the machinegun into the machinegun port until the rearmost portion of the jacket assembly (the disconnecter holes) were flush with the machinegun bracket assembly.			97	97
. Inserted the two cap screws and lock washers in their respective holes and tightened them down			97	100
. Plugged in the machinegun electrical lead to the solenoid on the machinegun's backplate assembly.			90	80
LOAD M219 MACHINEGUN.	60	35	<u>97</u>	<u>78</u>
. Pushed forward on the rear of the left cover latch rod assembly and raised the cover			100	100
. Raised the feed tray.			100	100
. Placed the machinegun safety in the FIRE position			100	100
. Charged (cocked) the machinegun by pulling the charger handle to the rear.			100	97
. Inspected the chamber for obstructions by looking and feeling in the chamber			100	100
. Placed safety in the SAFE position.			98	100
. Lowered feed tray			98	100
. Fed ammunition belt through chute of ammunition box.			98	100
. Placed first round of ammunition belt in feed tray slot with the open side of ammunition link loops facing down.			98	94
. Closed machinegun cover assuring that lock rod is engaged.			100	97
DISASSEMBLE MAIN GUN BREECHBLOCK				
REMOVAL	60	60	<u>23</u>	<u>33</u>
. Placed the main gun safety switch in the SAFE position			38	67
. Placed breechblock crank stop in the REAR position			43	63
. Opened the breech and looked for obstruction			48	53

TABLE E.2--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
. Closed the breech manually by tripping the extractors with an empty cartridge case or a wooden block.			52	53
. Removed firing pin spring by depressing plunger, moving plunger to the right, twisting firing pin spring retainer counter-clockwise until the lug aligned with the groove in the breechblock, and removing the retainer and spring.			63	88
. Removed firing pin and retractor guide with firing pin retractor by inserting screwdriver blade into retractor guide slot and prying outward			63	88
. Screwed eye bolt into top of breechblock. . .			63	85
. Suspended chain hoist from hook on the turret ceiling and connected chain hoist to eye bolt			61	90
. Took up slack with the chain hoist to support breechblock			59	87
. Applied tension on closing spring by turning adjuster clockwise with spanner wrench.			50	77
. Removed tension from the closing spring by depressing plunger from its notch with a screwdriver and allowing adjuster to turn counter-clockwise under control of the spanner wrench.			50	78
. Inserted small screwdriver into hold in breechblock crank stop and slid stop forward			50	72
. Started breechblock downward by rotating operating handle rearward and down, and with chain hoist let the breechblock begin descending.			53	83
. Returned the operating handle to the latched position.			52	80
. Lowered the breechblock until breechblock crank pivot was free of the T-slot, and removed pivot			52	75
. Lowered breechblock until breechblock was on the turret floor			52	81
. Released chain hoist from the eye bolt. . . .			52	81
. Removed right and left extractors from the breech ring			47	70

TABLE E.2--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
DISASSEMBLE MAIN GUN BREECHBLOCK	60	60	<u>40</u>	<u>73</u>
. Depressed firing contact plate plunger and turned firing contact plate counter-clockwise until arrows on plate and breechblock were alined with each other.			42	73
. Removed firing contact plate, firing contact plate plunger, and spring.			42	75
. Removed plastic washer, firing contact, and firing contact sleeve.			40	75
. Removed retractor pivot pin and firing pin retractor from retractor guide			42	77
. Removed screw, washers, and clamp securing the retractor driver to the bottom of the breechblock. (Use Allen wrench to remove screws)			42	77
. Removed retractor driver, retractor driver shaft, and spring			42	77
ASSEMBLE MAIN GUN BREECHBLOCK.	60	60	<u>43</u>	<u>70</u>
. Installed retractor driver spring, shaft, and retractor driver into the bottom of the breechblock			45	77
. Affixed the retractor group to the bottom of breechblock by installing securing clamp, washers, and screw with the Allen wrench			48	77
. Inserted firing contact sleeve, firing contact, plastic washer, spring, and firing contact plate plunger into the breechblock.			48	78
. Installed firing pin retractor into retractor guide and secured it with the retractor pivot pin.			47	75
. Replaced firing contact plate by alining the arrow and depressing and rotating the plate clockwise until firing contact plate plunger engaged locking note in plate			48	77

TABLE E.2--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
INSTALL MAIN GUN BREECHBLOCK.	60	60	<u>42</u>	<u>53</u>
. Installed right and left extractors into extractor pivots in the breech ring			55	75
. Inserted chain hoist into eye bolt on breechblock			57	79
. Raised breechblock and guided it into breech ring until breechblock came in contact with extractor plungers			57	80
. Depressed plungers and moved breechblock upward.			47	80
. Installed breechblock crank pivots in breechblock crank			50	78
. Inserted pivot in breechblock T-slot. . . .			50	77
. Tripped extractors with the screwdriver and raised the breechblock to the closed position.			52	78
. Inserted small screwdriver or rod into the hole in breechblock crank stop and slid stop to the rear position			53	65
. Jiggled the crank stop back and forth to assure that the plunger was seated in its recess.			53	67
. Released the tension on the chain hoist . . .			56	75
. Turned adjuster clockwise until plunger entered the first recess.			54	73
. Removed the chain hoist and eye bolt. . . .			54	73
. Installed retractor guide with firing pin retractor and firing pin in its well by pushing guide forward until it was flush with inner surface of the well.			57	75
. Installed firing pin spring and firing pin spring retainer			56	71
. Depressed plunger, and twisted retainer clockwise until plunger was seated in its recess.			56	75
. Opened and closed breech several times to test for binding or shock			54	75
. Adjusted tension on the closing spring to counteract any binding or shock in breech operation			52	71

TABLE E.2--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
PREPARE TANK FOR BORESIGHTING.	60	60	<u>58</u>	<u>82</u>
. Placed back thread over witness lines on muzzle end of main gun and secured thread tautly.			75	93
. Removed firing mechanism from breech-block.			65	85
BORESIGHT M219 MACHINEGUN MOUNTED ON TANK. . .	60	35	<u>25</u>	<u>17</u>
. Removed the solenoid electrical lead from the machinegun backplate assembly by pulling the solenoid plug down			33	33
. Pulled the right disconnecter ring rearward to disengage the disconnecter pin from the disconnecter hole			43	60
. Rotated the receiver downward and pulled rearward until disengaged from mounting block.			45	45
. Loosened support setscrews located in the gun mounted cover shield collar approximately 1 1/2 turns			37	31
. Selected the target employed to boresight the main gun			42	40
. Alined the machinegun bore vertically on target while viewing the aiming point through the right binocular M17A1 so as to adjust the machinegun elevation alinement with the bore of the main gun by loosening or tightening the adjusting screws			45	40
. Alined the machinegun bore horizontally while viewing the aiming point through the right binocular M17A1 so as to adjust the machinegun azimuth alinement with the bore of the main gun by loosening or tightening the front end and rear horizontal adjusting screws.			42	46
. Tightened all lock and jam nuts.			40	53
. Adjusted support setscrews in the gun mount cover shield collar until they contact the flash suppressor body then backed them off 1/4 to 1/2 turn			33	31

TABLE E.2--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
CHECK BORESIGHT ALINEMENT OF MAIN GUN.	60	60	<u>50</u>	<u>82</u>
On request from Gunner to confirm that muzzle cross threads are on aiming point:				
. Checked alinement of main gun by sighting through firing pin hole with M17A1 binocular to see if cross threads lay on aiming point.			50	86
. Reported gun out of alinement and assisted Gunner to aline it			48	85
PERFORM MAIN GUN PREPARE-TO-FIRE CHECKS FROM LOADER'S STATION	60	60	<u>13</u>	<u>43</u>
On command "PREPARE TO FIRE":				
. Checked recoil oil by feeling replenisher indicator tape for one rough and one smooth edge.			80	92
. Opened breech and looked in chamber for obstruction.			65	75
. Tightened M219 machine gun mounting bolts			28	56
. Plugged electrical lead into solenoid.			20	47
On command "CHECK FIRING SWITCHES":				
. Placed main gun safety switch in FIRE position			63	85
. Installed circuit tester between breechblock and face of chamber.			67	86
. Observed for lighting of circuit tester bulb each time Gunner or TC announced "ON THE WAY", and announced "NO FIRE" any time bulb failed to light			58	87
. Closed the cover on the coaxial machinegun, charged it, and listened for forward action of barrel and barrel extension when Gunner and TC activated firing switches (recharging coax before each check).			45	81
. Removed and stowed circuit tester.			52	84
On command "REPORT":				
. Reported "LOADER READY".			53	77

TABLE E.2--Continued

TASK AND TASK ELEMENTS	<u>N</u>		% Pass	
	PRE	POST	PRE	POST
KNOW TARGET ACQUISITION TECHNIQUES.	0	59	<u>-</u>	<u>0</u>
. Knew target acquisition scanning techniques.			-	0
. Knew procedures for locating and reporting targets			-	7
. Knew target range estimation procedures . . .			-	17
READ REPLENISHER TAPE	58	60	<u>65</u>	<u>59</u>
. Reached up with left hand behind the rangefinder and to the left end of the replenisher cylinder and felt tape.			98	90
. Took no action if felt one rough edge and one smooth edge			97	95
Added oil to replenisher (after announcing "CEASE FIRE," if during firing) if felt rough edges on both sides of tape			88	86
. Continued to check tape frequently during firing if felt smooth edges on both sides of tape, but drained oil from replenisher at first opportunity.			80	69
. Drained oil from replenisher (after announcing "CEASE FIRE," if during firing) if felt two long notches in tape.			75	71

TABLE E.3

PERCENT OF TRAINED GUNNER/LOADERS PASSING EACH ELEMENT OF
THE GUNNER TASKS IN THE INITIAL (PRE) AND FOLLOW-UP (POST) TESTS

TASK AND TASK ELEMENTS	<u>N</u> ¹		% Pass ²	
	PRE	POST	PRE	POST
CHECK OPERATION OF M3 HEATER.	21	60	<u>33</u>	<u>41</u>
On Driver's request, "CHECK GAS PARTICULATE UNIT":				
. Rotated air heater knob to ON and check for Indicator lamp operation.			67	86
. Checked air flow through hose			76	83
. Allowed air to warm up for at least five minutes.			38	64
. Checked air temperature			40	66
. Adjusted protective mask and attached air hose.			67	69
. Removed and stowed air hose and pro- tective mask.			57	68
. Rotated air heater switch to OFF and listened for audible click			52	71
. Reported status of M3 Heater to Driver. . . .			43	49
CHARGE MANUAL ELEVATION SYSTEM.	60	59	<u>35</u>	<u>25</u>
. Rotated the manual elevation handle to depress the main gun until the handle could no longer be rotated with one hand.			35	25
PREPARE GUNNER'S TELESCOPE FOR OPERATION. . . .	60	60	<u>5</u>	<u>2</u>
. Tightened eyepiece hanger and screws.			7	12
. Seated pin on the telescope and the slot on the holder assembly.			7	13
. Adjusted headrest by loosening adjusting nut and sliding headrest to desired position and tightening nut			18	40
. Cleaned lenses.			35	52
. Focused eyepiece by rotating diopter to the maximum plus reading and then rotating back.			35	56
. Set reticle illumination by rotating the rheostat knob on instrument light M50 . . .			8	33

¹ N = Number of soldiers who attempted the task.

² Percent of soldiers passing the overall task (i.e., passing every element in the task) is underlined.

TABLE E.3--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
. Removed filters from filter box.			7	15
. Attached filter to telescope eyepiece. . . .			8	15
. Viewed through eyepiece and moved reticle selector to each position checking to see that both reticles are visible.			17	30
PREPARE GUNNER'S PERISCOPE FOR DAYLIGHT OPERATION.	60	60	<u>13</u>	<u>10</u>
. Adjusted the daylight and IR headrest for proper fit			23	37
. Opened ballistic shield.			42	67
. Adjusted diopter on the daylight sight by rotating the diopter to the maximum-plus reading and then back.			32	43
. Set the reticle illumination by rotating the light source control knob until reticle appears with desired brightness			22	22
PLACE TURRET INTO POWER OPERATION.	60	60	<u>2</u>	<u>7</u>
. Performed zero pressure check to insure accumulator charge of 450-500 PSI.			20	17
. Checked hydraulic power pack oil level . . .			23	27
. Insured the tank and surrounding area are clear of obstruction			15	35
. Insured crew is in safe position and Driver has lowered seat and has his head down			5	25
. Instructed Loader to release gun tube from travel lock			17	32
. Unlocked turret lock			38	40
. Announced POWER to alert the crew.			67	47
. Asked driver if engine was running and set at 800 to 900 RPM.			3	17
. Placed manual traversing handle locking lever in the detent position			6	36
. Turned TURRET POWER switch ON.			83	68
. Squeezed magnetic brake switch and rotated Gunner's control handle to traverse turret			19	50
. Rotated handles rearward and forward to elevate and depress gun.			22	48

TABLE E.3--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
PERFORM PREPARE-TO-FIRE CHECKS FROM GUNNER'S STATION				
ON COMMAND, "PREPARE-TO-FIRE":	60	60	<u>27</u>	<u>28</u>
. Cleaned interior direct fire sights.			58	63
. Opened and closed ballistic shield			40	32
. Checked instrument lights and indicated they were inoperative.			33	42
ON COMMAND, "CHECK FIRING SWITCHES":	60	60	<u>38</u>	<u>73</u>
. Turned main gun switch ON.			63	90
. Depressed firing trigger on power control handle and trigger on manual elevating control handle			65	88
. Rotated main gun manual firing device T-handle			65	88
NOTE: Announced ON THE WAY each time a trigger is checked for the main gun or the manual firing device is actuated.				
. Turned main gun switch OFF			53	85
. Turned coaxial machinegun switch ON.			43	76
. Depressed firing trigger on manual elevating control handle			43	78
. Turned coaxial machinegun switch OFF			40	78
ON COMMAND, "CHECK FIRING CONTROLS":	60	60	<u>5</u>	<u>13</u>
. Set range correction knob of ballistic computer at zero			8	17
. Turned superelevation handcrank.			13	22
. Pushed RESET button on computer.			7	23
. Index various ranges into computer			10	24
. Turned range correction knob of ballistic computer to proper setting			8	18
. Reported GUNNER READY on command REPORT. . .			8	28
PREPARE TANK FOR BORESIGHTING.	60	60	<u>80</u>	<u>82</u>
After "LOADER" removed firing mechanism from breechblock:				
. Centered right telescope of binocular M17A1 over firing pinhole.			80	85

TABLE E.3--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
. Alined axis of 105mm gun bore on right angle of aiming point by operating the manual traversing and elevating handles according to the Loader's directions.			83	83
PREPARE AZIMUTH INDICATOR FOR OPERATION . . .	60	60	<u>3</u>	<u>12</u>
. Rotated rheostat knob until desired brightness is obtained.			13	47
. Placed the aiming cross of the periscope on the reference point.			20	39
. Performed accuracy tests by manually traversing turret 360 degrees to return to original reference point			5	25
. Set the micrometer and azimuth points on zero			20	52
. Performed slippage test by traversing the turret rapidly in power and stopping suddenly			5	22
. Repeated this operation two or more times in same direction			5	22
. Traversed turret manually in opposite direction to return to original reference point.			5	22
. Insured that both the micrometer and azimuth points are on zero.			32	25
OPERATE ELEVATION QUADRANT (ELEVATE MAIN GUN TO +15)	60	60	<u>50</u>	<u>60</u>
. Placed aiming point on the center of the target and established a line of sight.			53	73
. Measured the position of the gun tube by rotating the micrometer knob until the bubble is centered in the level vial.			53	75
. Announced elevation by reading from the elevation and micrometer scales.			62	67

TABLE E.3--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
BORESIGHT GUNNER'S TELESCOPE.	60	60	<u>15</u>	<u>13</u>
. Set superelevation counter on the ballistic computer to zero.			20	23
. Moved reticle selector switch until reticle corresponding to type of ammunition that will be used to zero can be seen through the eyepiece.			20	37
. Unlocked telescope mount elevation and deflection boresight knobs.			37	53
. Rotated the boresight knobs until the boresight aiming point is in the same position as the muzzle cross threads. . .			35	55
. Moved elevation and deflection knob locking levers to the lock position . . .			37	53
. Rotated slip scales on the elevation and deflection knobs to read 3 and 3.			32	47
. Told Loader to confirm that the muzzle cross threads are on the aiming point			33	40
BORESIGHT DAYLIGHT SIGHT OF GUNNER'S PERISCOPE	60	60	<u>37</u>	<u>45</u>
. Sighted through the eyepiece, disengaged the elevation and deflection boresight knobs, and rotated the knobs until the aiming cross is on the same aiming point as the muzzle cross threads.			40	78
. Rotated slip scale on the elevation and deflection boresight knobs to read 4 and 4			37	63
. Placed daylight sight reticle on the aiming point			40	56
. Told Loader to confirm that the muzzle cross threads are on the aiming point . . .			37	¹
BORESIGHT IR SIGHT OF GUNNER'S PERISCOPE DURING DAYLIGHT	59	56	<u>0</u>	<u>4</u>
. Opened the ballistic shield			7	9
. Placed opaque material over the periscope head assembly with a 3/4 inch hole in line with the IR body			5	9

¹ Step not performed.

TABLE E.3--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
. Placed the IR switch in the 1.5 volt position.			3	11
. Viewed through the IR eyepiece and rotated the IR diopter to the maximum plus reading then back until the grain on the converter tube surface as seen through the eyepiece appears clear and sharp			5	7
. Rotated the light source control until the reticle illumination has the desired brightness.			3	7
. Sighted through the eyepiece and rotated focusing ring until the target appears with the maximum sharpness.			5	7
. Disengaged and rotated the elevation and deflection boresight knobs until the aiming cross of the reticle is alined on the same aiming point as the muzzle cross threads.			5	7
. Rotated slip scale on the elevation and deflection boresight knobs to read 4 and 4			2	11
. Placed aiming cross on the reticle of the daylight scope on the aiming point. . . .			3	7
. Told Loader to confirm that the muzzle cross threads are on the aiming point . .			3	7
BORESIGHT TANK SEARCHLIGHT USING THE ALTERNATE METHOD.	10	19	<u>10</u>	<u>0</u>
After "TC" laid the bottom of the searchlight beam above and just touching the reference mark:				
. Removed superelevation from fire control system using computer's handcrank			10	0
. Boresighted main gun of lower cross			10	0
. Centered the bubble on the elevation quadrant using the micrometer knob. . . .			10	0
. Applied plus 5 mils to elevation quadrant using the micrometer knob. . . .			10	0
. Manually elevated the gun until the bubble is centered.			10	0

TABLE E.3--Continued

TASK AND TASK ELEMENTS	<u>N</u>		<u>% Pass</u>	
	PRE	POST	PRE	POST
BORESIGHT AN M219 MACHINEGUN MOUNTED ON A TANK.	33	35	<u>30</u>	<u>23</u>
After "LOADER" tightened both horizontal adjustment screws:				
. Rotated, either to the left or right, the rheostat knob on the infinity sight M44C for periscope M31 or the rheostat knob of the light source control for periscope M32 in order to adjust brightness of reticle.			33	31
. Rotated both the elevation and deflection boresight knobs on the infinity sight so as to aline the center reticle on aiming point of target			33	23

TABLE E.4

PERCENT OF SOLDIERS PASSING EACH TASK ELEMENT OF THE
ARMOR COMMON TASKS IN THE INITIAL (PRE) AND FOLLOW-UP (POST) TESTS

TASK AND TASK ELEMENTS	<u>N</u> ¹		% Pass ²	
	PRE	POST	PRE	POST
LOAD THE CALIBER .45 PISTOL.	88	87	<u>100</u>	<u>93</u>
. Inserted magazine.			100	100
. Pulled slide to the rear then released . . .			100	93
CLEAR THE CALIBER .45 PISTOL	88	87	<u>97</u>	<u>89</u>
. Kept the weapon in RAISED PISTOL position. .			98	98
. Removed magazine			100	99
. Pulled slide to the rear and locked				
slide.			100	93
. Looked and felt into chamber			99	94
. Allowed slide to go forward.			99	98
. Pulled trigger			98	95
DISASSEMBLE THE CALIBER .45 PISTOL	87	87	<u>99</u>	<u>99</u>
. Removed recoil spring plug			100	100
. Removed slide top.			99	99
. Removed receiver group			99	99
. Removed recoil spring and recoil				
spring guide			99	99
. Removed barrel bushing			99	100
. Removed barrel and slide group			99	99
ASSEMBLE THE CALIBER .45 PISTOL.	86	87	<u>97</u>	<u>85</u>
. Inserted barrel in slide group			98	94
. Inserted barrel bushing.			98	92
. Replaced recoil spring and recoil				
spring guide			99	94
. Replaced receiver group.			98	94
. Replaced slide stop.			98	92
. Inserted magazine.			97	87
. Performed a function check			97	89

¹ N = Number of soldiers who attempted the task.

² Percent of soldiers passing the overall task (i.e., passing every element in the task) is underlined.

TABLE E.4--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
PERFORM IMMEDIATE ACTION ON CALIBER				
.45 PISTOL.	87	87	<u>98</u>	<u>71</u>
. Recocked hammer and attempted to fire . . .			99	82
. Waited ten seconds for hang fire.			99	83
. Pulled slide to the rear.			99	91
. Allowed slide to go forward			99	92
. Attempted to fire			100	91
LOAD THE M3A1 SUBMACHINEGUN	88	87	<u>95</u>	<u>88</u>
. Opened cover.			99	93
. Pulled bolt to the rear			99	93
. Closed cover.			95	90
. Inserted magazine			95	95
CLEAR THE M3A1 SUBMACHINEGUN.	87	87	<u>95</u>	<u>91</u>
. Pressed magazine catch and removed magazine.			100	97
. Opened cover.			100	98
. Pulled bolt to rear, looked and felt into chamber			99	92
. Squeezed trigger and allowed bolt to go forward			100	95
. Closed cover.			99	93
DISASSEMBLE THE M3A1 SUBMACHINEGUN.	86	87	<u>95</u>	<u>94</u>
. Removed stock			100	98
. Removed trigger guard			100	97
. Removed housing assembly.			100	95
. Removed magazine catch assembly			98	95
. Removed barrel.			100	95
. Removed bolt and guide group.			100	95
. Removed sear pin.			100	94
. Removed trigger pin			100	94
. Removed trigger and sear group.			100	94

TABLE E.4--Continued

TASK AND TASK ELEMENTS	N		% Pass	
	PRE	POST	PRE	POST
ASSEMBLE THE M3A1 SUBMACHINEGUN.	86	87	<u>92</u>	<u>75</u>
. Connected trigger and sear group			98	78
. Inserted trigger pin			98	78
. Inserted sear pin.			98	78
. Inserted bolt and guide group.			99	85
. Inserted barrel.			99	85
. Inserted magazine catch assembly			98	83
. Inserted housing assembly.			99	84
. Inserted trigger guard			99	84
. Inserted stock			99	83
. Performed a function check			98	83
PERFORM IMMEDIATE ACTION ON M3A1 SUBMACHINEGUN.	87	87	<u>81</u>	<u>70</u>
. Removed the magazine			88	72
. Retracted the bolt			97	92
. Looked and felt into chamber			93	88
. Closed the cover, replaced the magazine, opened the cover and attempted to fire . .			83	81
GIVE FIRST AID TO BURN VICTIM.	88	86	<u>30</u>	<u>51</u>
Soldier must say or do the following:				
. Cut and gently lift away clothing covering burn without touching burn			90	88
. Avoid removing clothing touching burn and avoid cleaning burn.			81	79
. Avoid pulling clothing over burn area. . . .			67	72
. Avoid breaking blisters.			45	61
. Avoid putting ointments or medications on burn.			48	64
. Place and secure sterile dressing over burned area.			78	74
. If casualty is conscious, prepare and give salt solution over 1-hour period			78	68
. Stop giving solution if casualty becomes nauseated.			39	65

TABLE E.4--Continued

TASK AND TASK ELEMENTS	<u>N</u>		% Pass	
	PRE	POST	PRE	POST
GIVE FIRST AID TO FRACTURE VICTIM.	88	85	<u>52</u>	<u>65</u>
Soldier must say or do the following:				
. Avoid moving the casualty.			66	74
. Use available material to pad splints. . . .			75	84
. Place a minimum of two tiers above the break and two tiers below the break. . . .			79	80
. Place a splint on each side of the break to immobilize fracture and adjacent joints			91	89
. Secure splints with tiers, ensuring that knots are . . splints and not on casualty's limb.			75	86
. Ensure that no tiers are directly over break.			68	83